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Original Communications

FACTORS INFLUENCING END-RESULTS IN CARCINOMA OF THE CERVIX AFTER IRRADIATION*

BY ROBERT A. KIMBROUGH, JR., M.D., AND CHARLES C. NORRIS, M.D., PHILADELPHIA, PA.

CARCINOMA of the cervix is the most frequent malignant neoplasm in the female genital tract. The ultimate mortality varies from 50 to 90 per cent. It is obvious, therefore, that no satisfactory method of treatment has yet been evolved. Of the various procedures employed radical hysterectomy or irradiation gives the best results. In cases in which the growth is definitely limited to the cervix, the two methods yield practically equal end-results. In all cases in which the tumor has extended beyond the cervix, however, irradiation is the method of choice.

Satisfactory comparison of end-results is extremely difficult because of the lack of uniformity in classification of cases and in standards of cure. At the University Hospital the classification suggested by Schmitz[1] of Chicago has been employed.

Stage 1 includes those cases which are definitely limited to the cervix; Stage 2 includes the cases of borderline operability; Stage 3 cases are those which are definitely inoperable; Stage 4 comprises cases in the terminal stage; Stage 5 includes cases of recurrent carcinoma after hysterectomy. This classification is to be recommended on account of its simplicity and the fact that it is based upon clinical data.

Any standard of cure is arbitrary, but freedom from symptoms after a five year period is the most generally accepted criterion. Quinquennial records are for many reasons preferable to the shorter three year studies.

*Read (by invitation) at a meeting of the Brooklyn Gynecological Society, May 7, 1926.

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There is definite need also for a uniform method of dealing with untraced cases in the preparation of statistics. The European method of counting such patients as dead is unfair to American surgeons. On account of the strict enforcement of registration laws existing in most European countries, few cases cannot be traced. This small number stands in marked contrast to the many untraceable patients in this country. The method recently adopted by Ward and Farrar,[2] of excluding lost cases from their report, seems a logical one, and has been employed by us.

It is a well-recognized fact that in other parts of the body tumors respond with marked variability to the effects of irradiation and that in many cases a more or less definite prognosis can be formulated from the histologic study of the type of neoplasm. Thus the basal-celled tumors of the skin melt away under irradiation and the squamous-celled type is always more or less resistant. The same may be stated for some types of sarcoma.

Our investigation was undertaken in an effort to explain the difference in response of various cases of cervical carcinoma to irradiation. It has been the experience of every gynecologist who employs radium in the treatment of cervical carcinoma, that some cases, indeed the majority, respond well to this form of treatment, but that occasional clinically identical cases are encountered which are almost if not entirely unaffected by irradiation. Our study comprises a combined clinical and histologic review of 120 cases and in addition a clinical review of 263 cases in another series.

The selection of cases for the clinical and histologic study has been an impartial one, as our only criteria were sufficiently detailed follow-up data and well-preserved tissue for microscopic study. Many of our earlier cases could not be included, for one or the other of these reasons. However, in recent years we have been able to follow over 90 per cent of our cases of carcinoma and a biopsy is done on every patient at the time of treatment.

The longer series of 263 cases includes all the cases of cervical carcinoma which had been treated by irradiation in the gynecologic clinic of the University Hospital prior to May 1, 1921.

Cervical cancers may be divided into two general types, namely, the epidermoid and the adenocarcinoma. The epidermoid types arise from the modified skin of the portio vaginalis and vary widely in their histologic characteristics. The adenocarcinomata arise from the glandular epithelium of the cervical canal and are of fairly uniform histologic structure.

The subdivisions of the epidermoid type are practically those of the normal skin of the portio vaginalis. In this study we have followed the classification suggested by Martzloff[3, 4] the spinous or prickle-celled, the fat spindle or basal-celled, and the transitional-celled types.

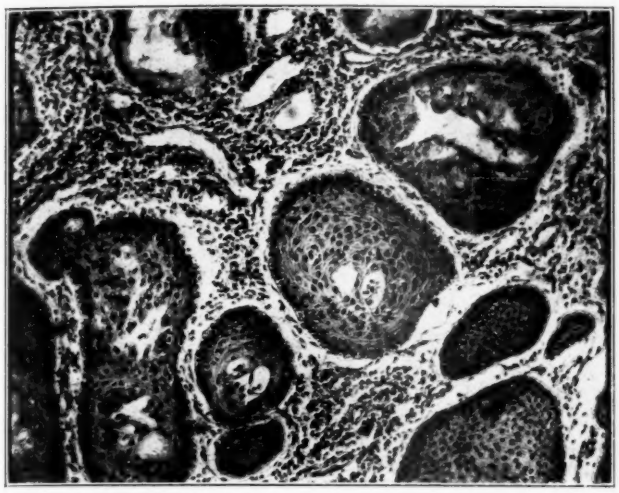

Fig. 1.—Prickle-celled type. The prickle-celled type is the most highly differentiated form of cervical cancer. The structure of the normal skin is closely reproduced. Epithelial pearls are often present. The tumor is characterized by a relatively large amount of connective tissue. Prickle cells are easily distinguished under a high-power objective. Mitosis is less frequent than in the less differentiated types. Polynuclear changes and hyperchromatosis are also less marked. Keratinization is generally well marked.

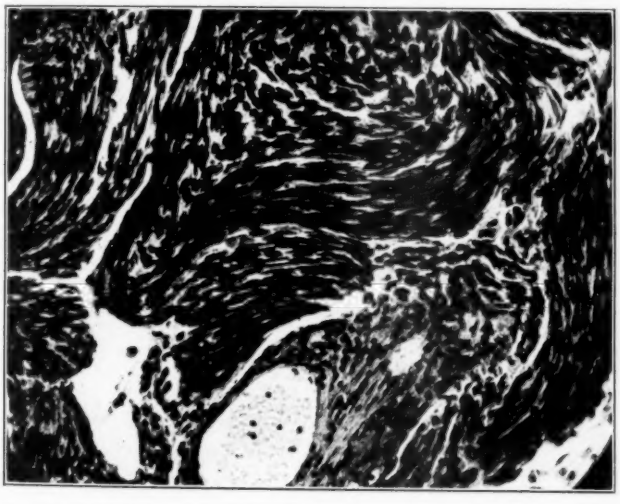

Fig. 2.—Basal-celled type. The basal-celled type is the most rapidly growing and the least differentiated of the cervical carcinomata. Mitotic figures are numerous. The nuclei vary widely in size and in staining characteristics. Many of these tumors bear a close resemblance to sarcoma.

The prickle-celled (Fig. 1) is that in which the flat, keratonized prickle cells predominate. Epithelial pearls may or may not be present. This type of cell bears a close resemblance to the most adult cells of the normal skin. The tumors in which prickle cells predominate are relatively differentiated.

The fat spindle or basal-celled (Fig. 2) closely resembles the germinal layer of the normal skin. The individual cells are young and reproduce so actively that the histologic picture closely resembles that

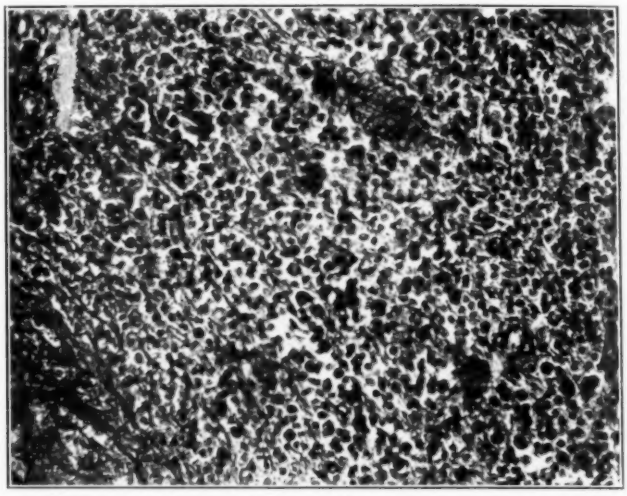

Fig. 3.—Transitional-celled type. The transitional type lies midway between the basal and prickle-celled types. Many characteristics of both forms are seen.

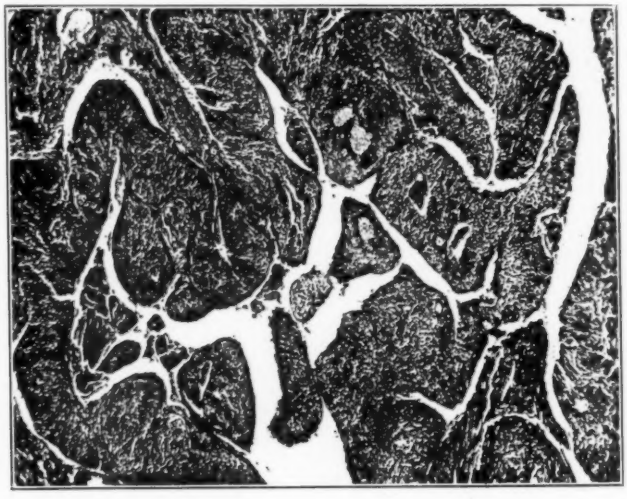

Fig. 4.—The mixed form. In this type of carcinoma there seems to be an attempt to reproduce all the layers of the normal skin. In some areas differentiation is well advanced, and in other locations groups of basal cells are seen.

of embryonal tissue. These tumors exhibit little or no tendency to differentiate into the normal skin structure. Many areas are found which have a sarcoma-like appearance.

The transitional type (Fig. 3) is made up of cells similar in charac-

ter to the midlayer of the skin. There is a moderate but limited tendency to reproduce the normal structure. This type stands between the prickle-celled and the basal-celled types in its histologic appearance.

We feel that these three types are distinct pathologic entities and remain the same throughout their existence and throughout the entire tumor. They may, however, be altered by environment, degenerative changes, and by irradiation.

To the above described three types of epidermoid carcinoma may be added a fourth variety which we have designated as the mixed form (Fig. 4). This tumor partakes of the characteristics of any two or all of the previously described varieties. It is often difficult to classify

Fig. 5.—Adenocarcinoma. The adenocarcinoma has its origin in the mucosa of the cervix, and there is a definite attempt to reproduce a gland bearing structure. Adenocarcinoma possesses the usual characteristics of cancer in that there is an irregular proliferation of glands which penetrate without regard to surrounding structures. The epithelium is columnar but rarely maintains the high goblet-like character of the normal cervical cells.

this form, but in our tables such tumors have been assigned to the group in which the predominating cell belongs.

The adenocarcinomata (Fig. 5) are easily distinguished from the epidermoid types. We have made no subdivision of this group as the histologic structure is practically uniform.

The relative malignancy of the various histologic types constituted our original line of study. This study was based on the degree of extension of the growth within a given time after the onset of symptoms.

Table I indicates the relative number of operable and inoperable cases in each of the histologic types within six months after the onset of symptoms.

TABLE I

TYPE	STAGE 1	STAGE 3
Prickle	29.5%	54.5%
Basal	25 %	58.3%
Transitional	17.6%	82.3%
Adenocarcinoma	60 %	40 %

On this basis the carcinomata in which the transitional cell predominates, are the most malignant. The adenocarcinomata extended least rapidly of any of the types which were studied.

The next step was to determine the variation of the histologic types in their response to irradiation.

According to the law of Bergonie and Tribondeau, young, highly cellular neoplasmata respond readily to irradiation and adult differentiated tumors are more resistant. Complete healing at the site of the growth three months after irradiation has been our criterion of satisfactory immediate response to treatment.

Table II shows the immediate results on this basis.

TABLE II

TYPE OF CELL	NO. OF CASES	HEALED LOCALLY AT THE END OF 3 MONTHS
Prickle	70	54.3%
Basal	19	57.9%
Transitional	29	41.3%
Adenocarcinoma	7	57 %

The basal-celled type presented evidence of the best immediate results.

The final criterion is, of course, the number of cases in each histologic group living and free from symptoms five years after irradiation.

Table III shows the five year salvage in reference to the histologic characteristics.

TABLE III

TYPE OF CELL	NO. OF CASES	FIVE YEAR SALVAGE
Prickle	25	28 %
Basal	10	20 %
Transitional	13	25 %
Adenocarcinoma	6	42.8%

In Table III the percentage of five year cures is higher than in our total series. This is, in all likelihood, due to the small number of cases, but we feel that the statistics are worth while as a *relative* index of response of the various histologic types.

In the epidermoid groups there is comparatively little difference in the end-results. This is probably due to the fact, that while the basal-celled tumors are more malignant, they respond more readily to treatment. The prickle-celled tumors are extremely resistant to irradiation, but are of a relatively low grade of malignancy. The

crossing of these two factors produces a practical equality of end-results.

Having found the study of the histologic characteristics of little prognostic value, our next effort was to determine the relationship between the degree of extension of the growth and the ultimate end-results.

Table IV shows the percentage of cases which presented complete local healing three months after treatment.

TABLE IV

STAGE	NO. OF CASES	PER CENT HEALED
1	42	73.8
2	11	45.5
3	67	41.8
4	5	40

As would be expected, the best immediate results were obtained in those cases in which the carcinoma was confined to the cervix.

Table V indicates the percentage of mortality five years after irradiation.

TABLE V

STAGE	NO. OF CASES	PERCENTAGE OF MORTALITY
1	27	63
2	23	87
3	121	86
4	52	98.1
5	39	87.2

Table VI is complementary to Table V in that it shows the percentage of patients living and well five years after treatment.

TABLE VI

STAGE	NO. OF CASES	PERCENTAGE OF 5 YEAR CURES
1	27	37
2	21	13
3	121	14
4	52	1.9
5	39	12.8

It will be noticed that the results in Stage 3 were slightly better than in Stage 2. This discrepancy may probably be accounted for by the comparatively small number of cases of borderline operability.

These results may be made more emphatic when tabulated according to the numerical chance of cure in each of the stages. (Table VII.)

TABLE VII

CHANCE OF FIVE YEAR CURE IN RELATION TO EXTENSION	
Stage 1	1 to 3
Stage 2	1 to 8
Stage 3	1 to 7
Stage 4	1 to 50
Stage 5	1 to 8

TABLE VIII

CLINICAL TYPE OF GROWTH	NO. OF CASES	PER CENT OF FIVE YEAR CURES
Papillary	19	31.5
Infiltrating	109	12.8

The next line of study was the relationship of the clinical type of growth to the end-result. Two general types were described, the papillary or cauliflower, and the infiltrating types. The gross appearance was described in 128 cases which had been treated five or more years ago. The papillary type constituted only 14.8 per cent of the entire series of cases. Table VIII shows the number of five year cures in each of these groups.

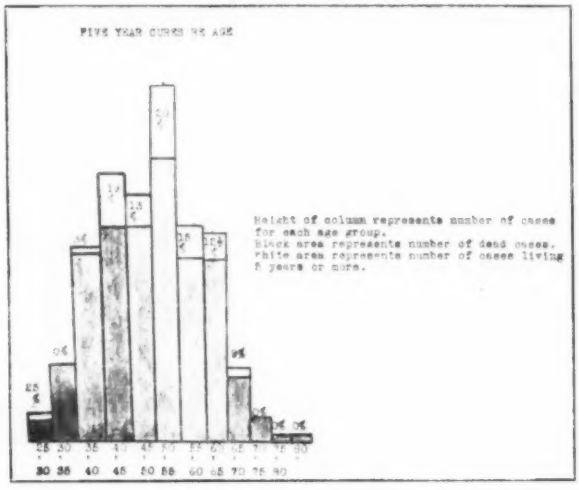
FIVE YEAR CURES BY AGE
Height of column represents number of cases for each age group.
Black area represents number of dead cases.
White area represents number of cases living 5 years or more.
30 35 40 45 50 55 60 65 70 75 80

Fig. 6.

Our final study was to determine the relationship between the age of the patient when first treated and the ultimate result. This relationship is shown in Fig. 6.

In this series the best results were found in patients between the ages of fifty and fifty-five years. The patients under the age of forty and those over the age of sixty-five years responded poorly to irradiation.

CONCLUSIONS

A. *Histologic Characteristics*—

1. The fat spindle or basal-celled tumors appear to be the most malignant.

2. The best immediate results were found in the basal-celled type.

3. The best end-results were obtained in the prickle-celled tumors.

4. The high grade of malignancy of the basal-celled tumor is probably offset by its greater susceptibility to irradiation so that the end-results are practically the same in all of the histologic types.

B. *Extension of the Growth*—

1. As would be expected, the best results were obtained in the Stage 1 cases. The ultimate mortality increased in direct proportion to the extent of the disease at the time of the first treatment.

2. Of the cases of recurrence after radical hysterectomy 12.8 per cent were living and well five years after irradiation.

C. *Clinical Type of Growth*—

The papillary form of cervical carcinoma gives a somewhat more favorable prognosis than the infiltrating variety.

D. *Age of Patient*—

1. The best results were obtained in patients between the ages of fifty and fifty-five years.

2. The patients under forty and those over sixty-five years of age responded poorly to treatment.

E. *General End-Results*—

1. The total five year salvage in 263 cases was 13.7 per cent.

2. The stage of the disease at which treatment is instituted is decidedly the greatest prognostic factor in cancer of the cervix, and is more important than the histologic type of the growth.

REFERENCES

(1) *Schmitz, Henry:* Jour. Am. Med. Assn., 1925, lxxxiv, 81. Am. Jour. Obst. and Gynec., 1925, ix, 644. (2) *Ward, George Gray, and Farrar, Lilian K.:* Jour. Am. Med. Assn., July 18, 1925. (3) *Martzloff, Carl H.:* Johns Hopkins Hospital Bulletin, 1923, xxxiv, 141. (4) *Martzloff, Carl H.:* ibid., 1923, xxxiv, 184.

(*For discussion, see page* 399.)

KRUKENBERG TUMORS AND THEIR PRACTICAL PROBLEMS*

By Julius Jarcho, M.D., F.A.C.S., New York City

(Attending Gynecologist and Obstetrician, Sydenham Hospital; Attending Gynecologist, Beth David Hospital and Home of the Daughters of Abraham)

IN 1896 Friedrich Krukenberg,[1] of Marburg, described the fibrosarcoma ovarii mucocellulare (carcinomatodes), a slow growth which apparently originated in the ovaries, affecting both simultaneously, and which was found in young and old alike. Enlargement of the ovaries resulted, without alteration of form or contour. On the cut surface solid portions are intermingled with myxomatous areas; the latter subsequently soften, and then cysts are formed. The spindle-shaped ovarian stroma cells proliferate as in sarcoma; among them may be found large and small groups (of cells) which contain mucinous protoplasm and resemble epithelial cells. Krukenberg stated, moreover, that the tumor propagates along the lymphatics, a property possessed by cancer. Despite the fact that he discovered the transition from ovarian stroma cells to mucinous quasi-epithelial cells, he believed that the tumors in question, five cases in all, belonged to the malignant connective tissue growths.

Since that time all ovarian tumors which enlarge the ovaries uniformly without distortion, which present alternations of fibrous areas with mucinous-cell groups, and which propagate along the lymphatics, are called Krukenberg tumors.† It is now known, however, that these tumors are not always primary ovarian and that slow growth is not an invariable characteristic.

Leopold[3] observed the simultaneous occurrence of gastric carcinoma and bilateral ovarian tumors. According to Bucher,[4] coexistent with bilateral ovarian carcinomas, a primary carcinoma is often to be found in the stomach. Heinrichs[5] pointed out that after the primary carcinoma of other organs, ovarian metastasis formation is of great importance, because it often leads to wrong diagnosis and frequently to unwarranted interference.

Schlagenhaufer[6] showed that most Krukenberg tumors are not primarily ovarian but rather metastases of abdominal organs, e.g., stomach, intestinal tract, or bile ducts. This observation brought to light work done earlier than that of Krukenberg. Thus Bode[7] in 1895 had described fibrosarcoma in ovaries of women previously operated on for pyloric carcinoma. In 1896 Fleischmann[8] reported to the Royal Medical Society of Budapest the extirpation of bilateral ovarian tumors which seemed to be fibrosarcoma myxomatodes, the postmortem revealing pyloric carcinoma. This observation was confirmed by Temesvary[9] from his own experience. Kötschau[10] operated on a woman of fifty-two for bilateral ovarian tumor; the autopsy showed carcinoma of the stomach. Waldyer[11] found carcinoma at the same time in stomach

*Based on the author's studies in the Pathology Department of the Szent István Hospital of Budapest, Chief Dr. J. Baló, Privat-Dozent of the University of Budapest.

†These should not be confused with perithelioma of one Richard Krukenberg.[2]

and ovaries, in his opinion both were primary. In all these cases the ovarian carcinoma may have been not simultaneous with the gastric carcinoma but rather a subsequent metastasis of it, with alterations in structure caused by reaction of the ovarian stroma.

Although instances are recorded where the primary or secondary, i.e., metastatic, character of the ovarian tumor was not established, either because primary growths were not sought in the gastrointestinal canal or because no autopsy was performed, yet there are cases in which careful search uncovered no carcinomatous tumor in the gastrointestinal canal. Therefore Krukenberg tumors should be divided into those which have a primary origin in the ovaries and those which arise secondarily by metastasis of abdominal carcinoma, e.g. of stomach, intestines or bile ducts. Marchand,[12] in whose institute Krukenberg's researches had been performed, asserted positively in 1919 that the first of Krukenberg's original five cases was a primary ovarian tumor, as also was a case observed very accurately by Schenk,[13] one reported by Gloeckner[14] and one reported by himself. In this last case Marchand found primary Krukenberg tumors in the extirpated ovaries of a fourteen-year-old girl, although no autopsy was made.

Marchand proposing to change the name fibrosarcoma mucocellulare carcinomatodes to carcinoma mucocellulare opposed K. Sternberg's theory[15] of the endothelial origin of primary Krukenberg tumors and declares them to be carcinomatous and derived from the follicle or the germinal epithelium, both of which according to Walthard[16] have a tendency to pseudomucinous transformation. Marchand is here supported by G. W. Outerbridge,[17] who reported a similar case, which he believed to be a fibrosarcoma with myxomatous degeneration, and declared that these ovarian tumors are not always of metastatic origin.

According to Miller,[18] up to 1918 Major[19] collected fifty-five cases of Krukenberg tumor and Frankenthal[20] in 1921 had the same number, whereas Schlagenhaufer as early as 1902 had collected seventy-nine, including eight of his own, of which he regarded sixteen as primary in the ovaries, but only six were subjected to autopsy, and of these only two had stomach examination.

It is of great practical importance to determine whether a Krukenberg tumor is primary or secondary. Schlagenhaufer advises that during operation for bilateral ovarian tumors careful examinations of abdominal organs be made. In operations for carcinoma of the stomach examination of the ovaries is absolutely of the first importance. According to Schauta,[21] if this operation discloses ovarian tumors the uterus and adnexa must also be removed since metastases along the lymphatics occur earliest in the genital organs. Hence in such cases removal of stomach, uterus and adnexa gives the best results. According to H. O. Neumann[22] during the operation for ovarian carcinoma search must be made in other organs for primary carcinoma, which if found must be removed. Ewing,[23] who studied five cases of Krukenberg tumors and one primary carcinoma with myxomatoid areas, inclines to the belief that pure Krukenberg tumors are always secondary.

Cases are recorded where the latent gastric carcinoma was first detected during operation for extirpation of ovarian tumors. That good results may be obtained in such cases with radical operations of the stomach following removal of ovaries corroborates the observation of Frankenthal, who removed the ovaries of a thirty-six-year old woman, then resected the stomach. Nine months afterward the patient was in good health and no morbid alterations could be detected. The observation of Frankenthal moreover accords with the opinion of Schauta. Schenk and Sitzenfrey[24] found the infiltration of the uterus and ovaries as metastases of gastric carcinoma. Frankenthal fails to specify just what sort of operation was done where the ovaries were removed, an important consideration, as the work of O. Frankl[25] shows. Frankl examined the uterus in eight cases out of twelve in which carcinoma of the ovaries accompanied primary carcinoma of the gastrointestinal canal and found

microscopic metastases. In the same group of people metastases occurred three times in the fallopian tubes and once in the wall of the vagina. Frankl also examined thirty-six cases of primary ovarian carcinoma and found the uterus and tubes grossly and microscopically free from metastases. He states that ovarian carcinoma is not necessarily followed by metastases in uterus and tubes and that therefore metastases found in the uterus after gastrointestinal carcinoma connected with ovarian metastases orginate not from the ovaries but from carcinoma of the gastrointestinal canal. He believes furthermore, that while ovarian metastases are likely to cause large-sized tumors, the uterine growth remains microscopic, and in such cases advises total extirpation instead of removal of the ovaries with or without supravaginal amputation of uterus.

Since the work of Frankl performed over many years and on a wide range of material has been a great contribution towards our understanding of these tumors, one hesitates to contradict even in the smallest detail, yet the following observations lead to conclusions which differ widely from those of Frankl on the same problem. In this connection I desire to report seven cases, five from the Pathological Department of the Szent István Hospital, Budapest, one supplied through the courtesy of Dr. B. Johan of the Hospital of the Jewish Community of Pest, one from the Laborer's Hospital of Pestujhely by the courtesy of Dr. Ö. Nachtnébel.

Only the essential facts of the histories are here presented.

CASE 1.—Mrs. M. A., age fifty-two years, admitted to gynecologic service of Zita Hospital, Budapest, June 14, 1926. First menses at sixteen years. Six children, no abortions. Last normal menses two years ago. Since then had irregular bleeding for the relief of which she entered the hospital. Examination showed a woman of medium height, undernourished. On percussion there was a flatness in the abdomen which was fluctuating and directed with convexity downward. Vaginally a solid mass was palpable in the small pelvis, the lower border at level of the linea terminalis and continuous with the left cornu of the uterus. It filled the vesicouterine space, the upper limit being two fingers below the umbilicus. Laterally the mass extended to the wall of the pelvis on the left side and on the right to the midline. Uterus of moderate size, anteflexed, retroverted and movable. In the region of the left sacrouterine ligament small nodules were felt. Patient had a rectocele.

Diagnosis.—Neoplasm of the left ovary.

Operation.—July 2, 1921, by Professor Scipiades, median incision, peritoneum found thickened and studded with small nodular formations. Peritoneal cavity contained two liters of clear, greenish-yellow serous exudate. Left ovary enlarged to size of newborn infant's head. Right ovary size of pigeon's egg. Bilateral salpingo-oophorectomy performed. Diagnosis at time of operation suggested as carcinoma of both ovaries and carcinosis of peritoneum.

Pathologic Examination.—Left ovary 15.5 cm. long, 9 cm. wide and 3 cm. thick. The tube was imbedded in the ovarian mass. The capsule of the ovary was maintained. Surface of ovary was irregular. The right ovary simulated the former but was smaller. Histologically in the left ovary there was a network of connective tissue in some places rich in spindle-shaped cells. Between the connective tissue were groups of epithelial-like cells which in some places contained nuclear divisions and in many places presented mucinous changes. The cytoplasm of these cells stained slightly blue with hematoxylin. There were mucinous masses in which only

a few nuclei were found. There was a transition from the above mucinous cells to connective tissue cells. The left tube contained, in the axis of the folds, groups of signet-ring cells. The latter were similar in appearance to the mucinous cells found in the left ovary. The right ovary contained fewer mucinous cells, but some scars and the graafian follicles were still observed. On the basis of this examination a Krukenberg tumor was diagnosed. The patient died two weeks after the operation with cachexia and pneumonia.

Report of Autopsy.—Fibrous carcinoma of the stomach infiltrating almost the entire wall of the stomach. Carcinosis of peritoneum with adhesions of the intestines. Moderately severe arteriosclerosis, chronic myocarditis, beginning hypoplastic pneumonia.

CASE 2.—B. K., age forty-six years, single, admitted to VII Internal Department of Szent István Hospital, Oct. 22, 1922, nullipara. Menses irregular for last four years. Three years previously was treated in a hospital for some gastric disturbance and discharged as well. One month previously began to have pains in both sides of the chest and was coughing.

Patient of very small stature, 138 cm. tall, bony frame, frail, tremor of the fingers and dragging of the legs when walking. Lumbar vertebra sensitive to touch. All reflexes normal. Heart narrow, peripheral blood vessels hypoplastic and patient looked older than her age. Thyroid could not be felt. Uterus size of a newborn infant's head, anteflexed, movable. Abdominal organs negative.

Clinical Diagnosis.—Myoma of uterus and dyshormonismus.

Patient died Dec. 20, 1922.

Autopsy.—Fibrous carcinoma of small curvature of the stomach with metastases in ovaries. Wall of stomach 1 cm. thick at the lesser curvature and was infiltrated by a tumor of white color. No ulcerations. Left ovary (Fig. 1.) 12 cm. long, 8 cm. wide and 6 cm. thick. Surface smooth but presented several depressions and elevations. Cut surface was in general whitish-grey and some places appeared transculent while in others there were yellowish areas of necrosis. Right ovary 12 cm. long, 5 cm. wide, 3 cm. thick. The external and cut surfaces were smaller to the left side. Chronic fibrous pneumonia (carnification). Hypertrophy and dilation of right heart, slight degree of hydrothorax, hyperemia of abdominal organs.

Histologic Examination.—The mucosa and submucosa, as well as muscular layer of stomach, infiltrated by tumor cells, which formed smaller groups. Form of the tumor cells atypical, cytoplasma vacuolated. In surface layer both ovaries contained fibrous connective tissue which penetrated into the substance. The connective tissue fibers separated by groups of cells of which the cytoplasma was light. Nuclei were pushed to the side by vacuoles and cells had a slight signet-ring shape. Mucicarmine stained the vacuole pinkish. In fallopian tubes and uterus no tumor found, but in the fornices nearer to the paracolpium places were found where the connective tissue spaces were filled by smaller groups of tumor cells.

CASE 3.—Mrs. E. S., aged thirty-one years, admitted to the II Internal Department of Zita Hospital, Oct. 19, 1922. Family history irrelevant. Complained of stomach trouble. In 1921 exploratory laparotomy was done on account of her stomach complaint but findings were negative. A few months after operation she still had pains and therefore reentered the hospital.

Examination.—Abdomen depressed. In right iliac fossa circumscribed resistance with irregular outlines could be felt. On left side above sigmoid was a mass the size of a man's fist which had the consisteney of cartilage and appeared to emerge from the small pelvis. It seemed to be adherent to the uterus. Liver, spleen and thoracic organs negative.

Fig. 1.—Case 2. Enlarged ovaries connected to normal-sized tubes and uterus. Note normal ovarian indentations with smooth surface between.

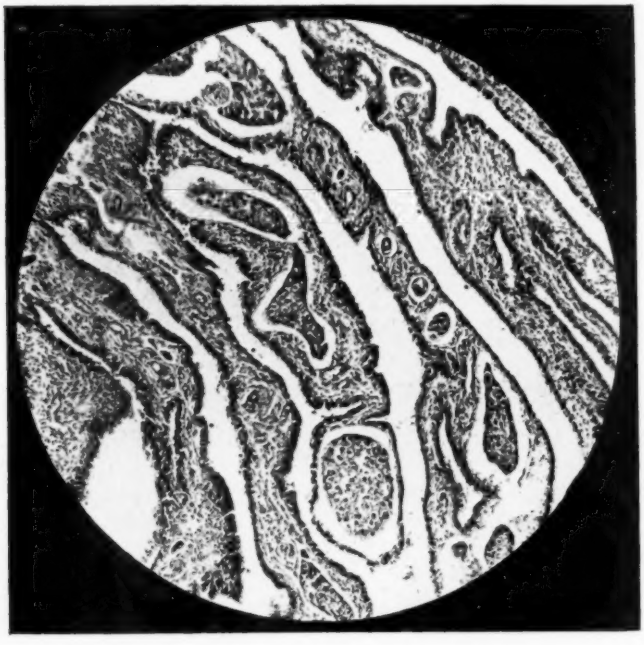

Fig. 2.—Case 3. Photomicrograph. Mucous membrane of fallopian tubes. In folds, solid groups of epithelial cells; cytoplasm light in places because of mucinous changes.

Clinical Diagnosis.—Carcinoma of the cecum.

Autopsy.—Scirrhous carcinoma of smaller curvature of stomach size of a palm of a newborn infant and superficial ulceration of the mucous membrane. Tumor adherent to pancreas and liver, metastases of the perigastric and mesenteric lymphatic glands. Metastasis of ovaries. Right ovary the size of newborn infant's head; left the size of man's fist. Surface smooth but irregular. Tumors of the ovaries were solid but in the right ovary there was a cyst with a smooth inner surface the

size of a walnut. Both ovaries entirely free from adhesions. Bronchopneumonia of inferior lobe of right lung, fatty degeneration of the heart, slight ascites. Scar above umbilicus from medial laparotomy of previous operation.

Histologic Report.—Superficial part of the mucosa of the stomach destroyed by ulceration. At this place smaller groups of epithelial cells penetrated into wall of stomach and could be traced between the muscle fibers. Beside the groups of tumor cells there were fibroblasts, lymphocytic and plasmocellular infiltration. The tumor cells contained large vacuoles making them light. The tumors of the ovaries contained atypically arranged groups of cells with mucinous degeneration. In other places the cells were arranged in groups like glands. The epithelium of these gland-like structures was irregular. The stroma between the glands contained spindle-shaped cells lying close together. Both tubes were infiltrated by groups of epithelial

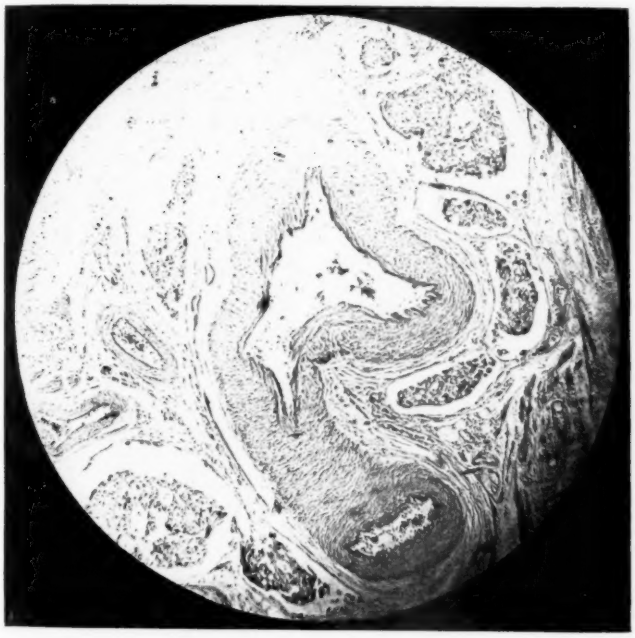

Fig. 3.—Case 3. Lymphatic vessels infiltrated with carcinoma cells around artery of fallopian tubes.

cells. These groups could also be found in the folds of the tubes. Besides the wall of the tubes such cells were to be found in the mesosalpinx (Fig. 3) especially in the lymphatics along the blood vessels. In the uterus, especially in the external layers between the muscle fibers and sometimes in spaces lined by endothelium, were solid masses of epithelial cells (Fig. 4). Both mucous membrane and serosa free from epithelial cells. In the bladder wall between the muscle fibers were small groups of epithelial cells. In some places these cells were limited in number (Fig. 5).

Case 4.—Mrs. S. K., aged thirty-six years, admitted to the VIII Internal Medical Department of Szent István Hospital, June 9, 1925. First menses at fifteen years. Two children; one abortion seven years ago. After the abortion she was seized with cramps during the night, bit her tongue, and became unconscious. Eight months after this she had another similar attack, evidently epileptic in character. Of late the attacks were more frequent and at time of admission occurred

Fig. 4.—Case 3. Small groups of epithelial cells filling lymphatic vessels around blood vessels in muscular wall of uterus.

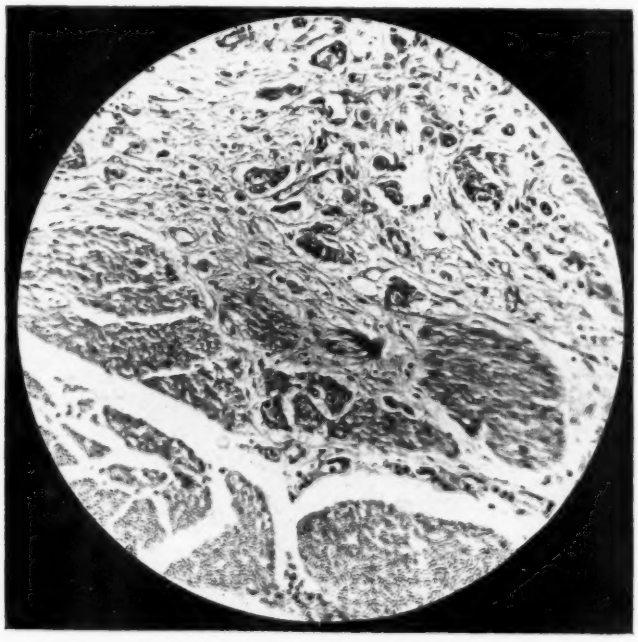

Fig. 5.—Case 3. Carcinomatous infiltration of wall of urinary bladder. Groups of epithelial cells penetrate between muscle fibers.

every two weeks. Abdomen had been growing larger for the last three weeks. She had a fever irregularly and bowels were also irregular.

Present Status.—Abdomen large with signs of fluid. The flatness changed with the change in patient's position. Pleural cavity contained a serous exudate. The abdominal and pleural exudates were aspirated several times but the cavities refilled. On objective external examination no other symptoms or lesions could be found. Pelvic examination presented a bilateral swelling of the appendages.

Clinical Diagnosis.—Tubercular polyserositis. Patient died April 1, 1926, of exhaustion following repeated aspirations.

Autopsy.—On the smaller curvature of the stomach an ulcer was found, oval in shape, measuring 7 cm. in length and 5 in breadth, with edges very much thickened. This thickening extended almost over the entire wall of the stomach. Serosa of the stomach thickened in some places and presented pinkish-white patches.

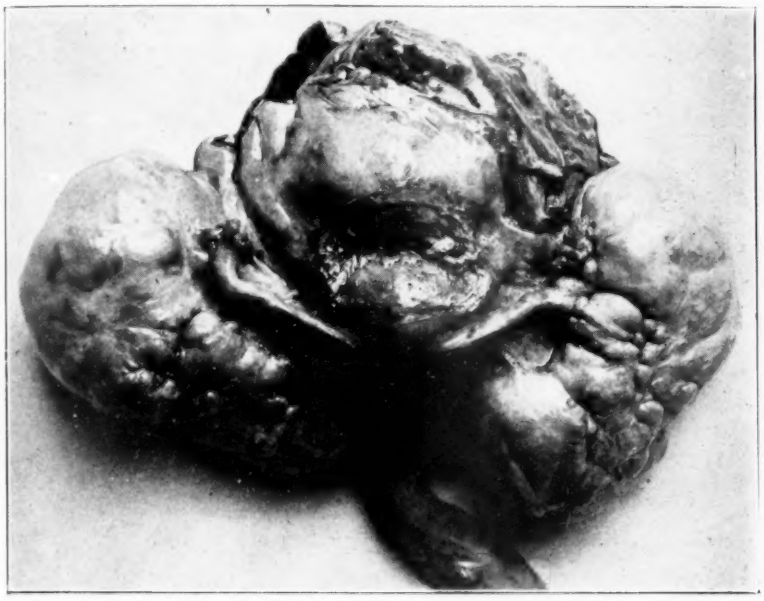

Fig. 6.—Case 4. Shrunken bladder, tubes thickened at ampulae, fimbriae not matted together, rectum collapsed. Ovary on each side greatly enlarged, but not adherent and with normal contour.

Left pleura covered in areas by nodules the size of lentils. On right side the pleural cavity contained a circumscribed area of exudate corresponding to the inferior lobe and above that there were adhesions. On left side the entire pleural cavity was filled by a serous exudate. The same was found in the abdominal cavity. Both ovaries (Fig. 6) presented an enlargement the size of a man's fist. These enlargements were uniform and the ovaries retained their original shape. The tubes were also thickened but the fimbriae were free. The peritoneal covering of the gall bladder and Glisson's capsule irregularly thickened. The root of the mesentery thickened. In the lungs, under the pleura were white thread-like branching lines like the branches of a tree. These were the infiltrated lymphatics. Bicuspid valve thickened and covered by fine verrucous deposits.

Diagnosis.—Fibrous carcinoma of stomach, metastases of ovaries and fallopian tubes, propagation of carcinoma to the mesentery and peritoneum, and lymphangitis

carcinomatosa of the lungs. Recurrent verrucous endocarditis. Chronic fibrous pericarditis, hemorrhagic infarction of the spleen.

Histologic Report.—Both ovaries contained a connective tissue stroma which was edematous in places. In the stroma were embedded single or grouped cells of mucinous cytoplasma resembling signet rings. There were necrotic areas present. In the fallopian tubes were found the same mucinous cells between the muscle fibers, and especially in the folds of the tubes. Bladder wall contained the same mucinous cells forming diffuse or group-like infiltration. This infiltration could be found under the mucous membrane as well as between the muscle fibers. The parallel muscle fibers were separated by stripes of mucinous cells.

CASE 5.—Mrs. F. L., aged fifty-two years, admitted to the Pajor Sanitarium, Aug. 22, 1925. Six children. Five abortions. Last confinement seventeen years prior. Six weeks before admission to the hospital she noticed that the abdomen had become large and felt a mass there. At the same time she began to have profuse vaginal bleeding causing weakness for which she sought relief. Examination revealed an enormous neoplasm in the abdomen, which seemed to be a bilateral ovarian tumor. The uterus was free and there was fluid in the abdominal cavity.

Operation (Prof. Hülte).—Median incision. Serous fluid in abdominal cavity. Right ovary multilocular, size of man's head. The appendix, 18 cm. long, passed in front of the pedicle and was adherent to left abdominal wall. Left ovary as large as the head of a newborn child. Loops of small intestines found adherent to left ovary. Posteriorly these tumors were adherent to the rectum. A bilateral salpingo-oophorectomy was performed.

Pathologic Examination (Dr. J. Baló).—The right ovary was as large as a man's head and on the surface was a cyst the size of a hen's egg. The external surface was smooth. On the cut surface were several cysts the size of hen's eggs and between the cysts the tumor substance was transformed to gelatinous masses. In these gelatinous areas nodules the size of millet and peas could be observed which were firmer in consistency. The left ovary was the size of a newborn infant's head and most of it was occupied by a cyst. The wall of this cyst was of fibrous connective tissue about 2 to 3 mm. thick. In one place the capsule contained bone. Cyst was filled with a jelly-like substance containing hair. Left tube was studded with nodules pearl-like in appearance, the size of peas, arranged in series of chains.

Microscopic Examination.—The solid part of right ovary presented denser or looser connective tissue in which groups of cells were embedded. These cells contained very light mucinous cytoplasma and nuclei pushed to one side. In some places real epithelial cells were found. Degenerated cells contained not fat but mucin. The wall of the left ovary consisted of fibrous connective tissue. Cavity of the cyst contained debris and hair. The left tube contained in its wall and in the folds groups of mucinous cells which corresponded to the pearl-like formations.

Diagnosis.—Fibrous carcinoma.

The right ovarian tumor presented structures similar to those of Krukenberg tumors. The mucinous cells were arranged more in groups than diffusely. The left tumor was a dermoid cyst but the left tube was also infiltrated by the new formation. The patient was discharged in apparent good health from the sanitarium, Nov. 7, 1925, then disappeared and could not be traced.

CASE 6.—Mrs. S. M., aged fifty-five years, admitted to the Hospital of the Jewish Community of Pest, Nov. 6, 1924, gynecologic service of Dr. Berezeller. Ten children, two abortions. Amenorrhea of five months. In the last two years menses irregular, every two to three months. In 1921 diagnosis of

gastroptosis made by a doctor. One month prior to admission patient was seized with an attack of severe abdominal pain; at that time was compelled to remain in bed and the pain was relieved by hot applications. One week before admission to hospital a physician made a diagnosis of tumor of the abdomen.

Present Status.—Externally abdomen presented a resistance of which the upper limit was four fingers' breadth above symphysis, to the left it reached the crest of the ileum and to the right the middle line. Bimanual examination revealed that posterior fornix was depressed by the tumor. Uterus anteflexed and movable, to the left of it a tumor the size of a hen's egg could be felt and to the right of the uterus a large movable mass.

Operation.—Nov. 13, 1924, median incision. Double salpingo-oophorectomy.

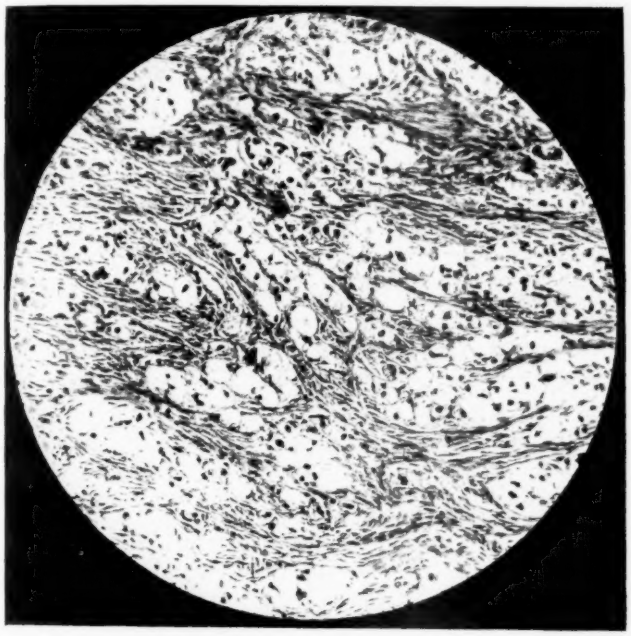

Fig. 7.—Case 6. Ovary, typical structure of Krukenberg tumor. Note signet-ring cells between fibrous connective tissue.

Pathologic Report.—Right ovary size of hen's egg, its surface contained nodules size of nuts and peas. On cut surface were small cysts filled with jelly-like substance. Left ovary greater than a fist in size. On the surface could be observed nodules similar to those on the right ovary and one the size of a hen's egg. On the cut surface this ovary presented, besides the cysts, large uniformly white masses between which was fibrous connective tissue. Some of these cysts were filled with coagulated blood. The sections prepared of both ovaries histologically presented the same structures, the only difference being that in the smaller right ovary the epithelial groups were more crowded and less connective tissue was found between them. In this ovary were gland-like ducts of which the epithelium was very irregular. In some areas were multiple layers where the epithelial cells possessed light granular cytoplasma and often had the signet-ring appearance (Fig. 7). In many places the glandular character of the masses disappeared and large masses occurred in which the cytoplasma of the cells was mucinous. In the

left ovary the structure was very similar but the glandular structure was less dominant.

Diagnosis.—Adenocarcinoma mucinosum of both ovaries.

Following the operation patient presented signs of progressive ileus which led on the fifth day to a laparotomy for its relief. This was performed Nov. 18, when general peritonitis was found. Patient died an hour after the operation.

Autopsy.—Perforation of stomach carcinoma.

Histologic examination of the thickened wall of stomach surrounding perforated ulcer showed that all layers of stomach were infiltrated by epithelial cells, in smaller and larger groups. Nuclei dark, very little cytoplasma in some cells; in other places it was light and granular. There were also cells wherein the cytoplasma contained a large mucinous droplet (Fig. 8), which pushed the nucleus to one side. Thus

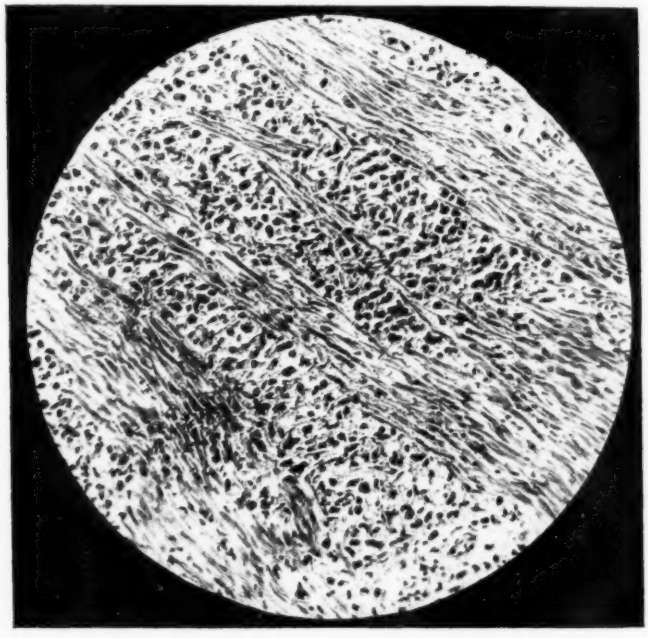

Fig. 8.—Case 6. Cross section of stomach wall. Muscle fibers separated by groups of epithelial cells with mucinous changes in cytoplasm.

in the stomach the expected carcinoma was histologically proved. It was gelatinous, resembling the carcinoma found in the ovaries. On the basis of these histologic findings in the ovaries and stomach the connection of both was self-evident. The primary carcinoma in the stomach must have given rise to metastases in the ovaries.

Case 7.—E. V., single, aged thirty-three years, admitted to the Internal Department of Laborer's Hospital at Pestujhely Dec. 15, 1925. First menses at 12 years. No children, no abortions, no leucorrhea. For the last two years lost appetite. Nine weeks previously pain in epigastrium, choking feeling in throat and vomiting following indiscretion in a meal. Had been very ill for one week and confined to bed for four weeks. Since then could not retain food and entered the hospital for relief of this condition.

Present Status.—Emaciated, poorly developed female. Skin pale, lymphatic glands not palpable. Tongue coated. Thoracic organs negative. In epigastrium there was

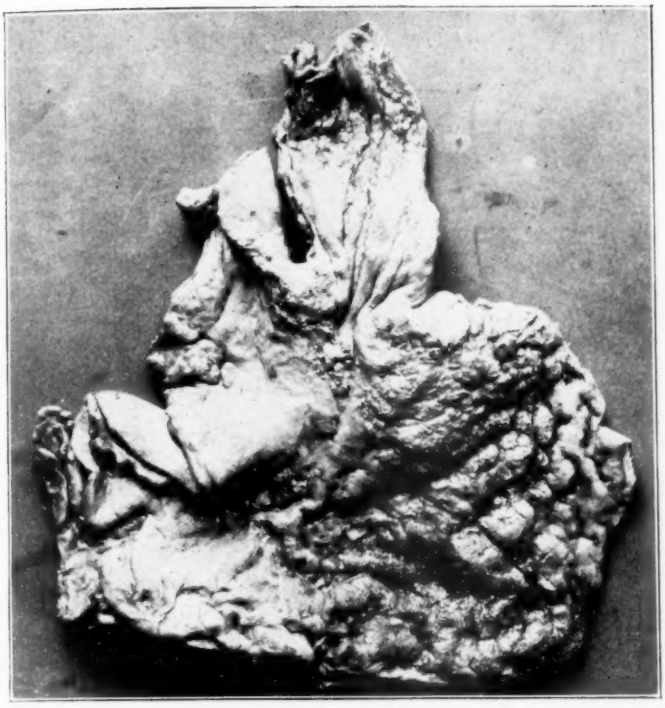

Fig. 9.—Case 7. Stomach totally infiltrated with fibrous carcinoma as far as lower part of esophagus. Note stenosis at cardia, with superficial ulcerations below; also folding of mucous membrane and thickening of entire wall.

Fig. 10.—Case 7. Bladder and genital organs. Uterus split mesially, ovaries and tubes free, both ovaries slightly enlarged as result of carcinomatous metastases.

felt a resistance size of a walnut. Liver, gall bladder and spleen not palpable. A test meal could not be carried out as it was impossible to introduce a stomach tube.

Roentgen Ray Examination.—The opaque meal could not be swallowed by patient. The lower part of esophagus was distended, antiperistalsis. The opaque meal was vomited. After administration of papaverin injection the obstruction was still present. Since the patient could not swallow, she was receiving nutrient enemata. Died Jan. 9, 1926, of emaciation.

Autopsy.—Stomach (Fig. 9) was very much contracted, about the size of a child's stomach. Length of lesser curvature 13 cm. Larger curvature 28 cm. Inner surface thrown into folds which were most marked on the fundus. Cardia constricted. Above cardia was an area of the esophagus 7 cm. in length which was also very much thickened and folded. Above this area nodules the size of lentils gave the inner surface of the esophagus a rough appearance. Below cardia on posterior wall of stomach an area 6 cm. long and 4 cm. wide presented superficial

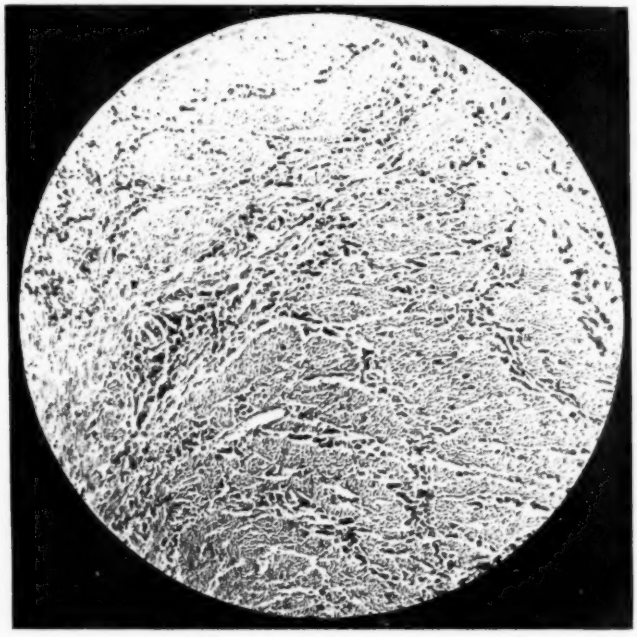

Fig. 11.—Case 7. Infiltration of fibrous carcinoma into muscular layer of stomach. Note small groups containing only few epithelial cells.

ulcerations. Smaller ulcerations also occurred in other areas of stomach. Both ovaries (Fig. 10) were uniformly enlarged, left 4.5 cm. long, 3 cm. wide and 2 cm. thick, surfaces smooth with but few depressions. On the cut surface the structure of the ovaries had largely disappeared. There were greyish red basal areas in which were white areas the size of lentils and peas. Both tubes perfectly free, thin and no fimbriae. Uterus firm and in its wall could be observed thin white tracts.

Diagnosis.—Scirrhous carcinoma of the stomach with propagation to the esophagus. Lymphangitis cancerosa of the mesentery. Metastases of the ovaries, liver and bones (ribs and lumbar vertebrae), cachectic anemia.

Histologic Examination.—All layers of the stomach wall were infiltrated by small groups of round epithelial cells (Fig. 11). Between these groups fibrous connective tissue was formed. Superficial layers of stomach mucosa gave no nuclear stain.

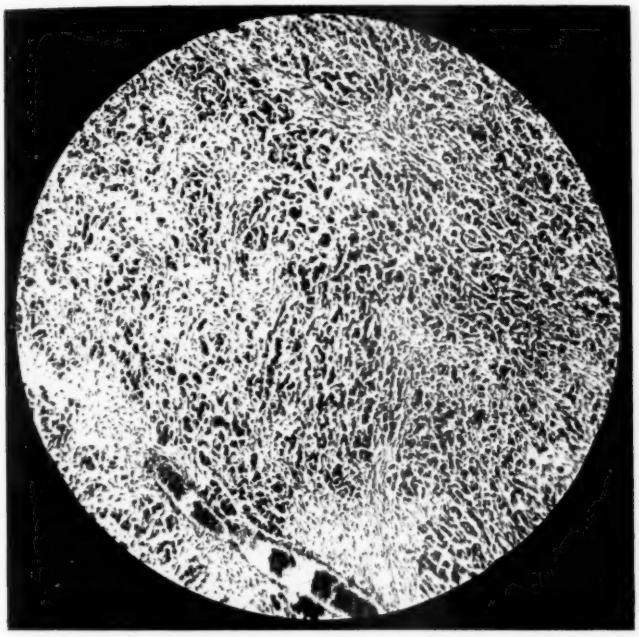

Fig. 12.—Case 7. Histologic structure of ovaries similar to structure found in stomach. Fibrous carcinoma without mucinous changes.

Fig. 13.—Case 7. Carcinomatous infiltration of muscular layer of uterus. Note groups of epithelial cells crowded between muscle fibers.

Mucinous degeneration not to be found. In the superficial layers of the ovaries only fibrous connective tissue was to be seen; under that smaller groups of epithelial cells appeared, between which the connective tissue was of fibrous character (Fig. 12). The mucinous degeneration of the epithelial cells was not well expressed. In some places the connective tissue presented myxomatous degeneration. In uterus under mucous membrane and also in mucous membrane the lymphatics were filled by epithelial cells (Fig. 13), but the cells there did not present mucinous degeneration. A carcinomatous infiltration was found between the muscle fibers of the urinary bladder. This followed often along the course of the blood vessel lymphatics (Fig. 14).

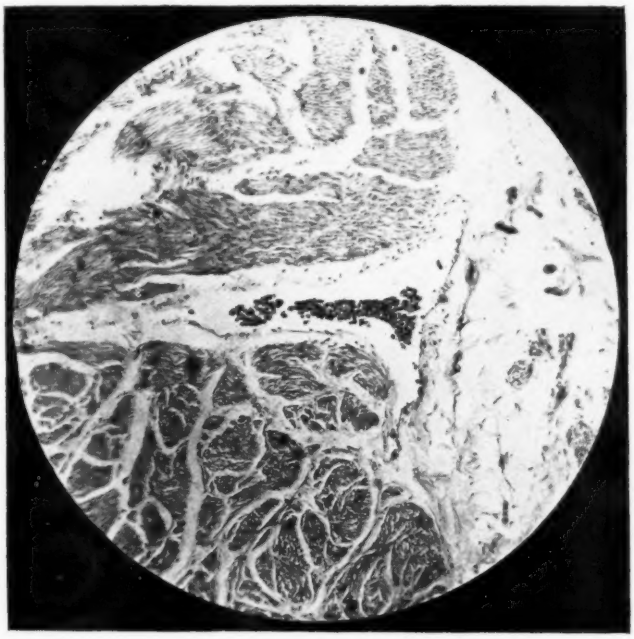

Fig. 14.—Case 7. Carcinoma cells filling lymphatic vessels in wall of bladder.

DISCUSSION OF MATERIAL AND DEDUCTIONS

In this series of seven cases, three patients were operated upon for tumors of the adnexa, the material removed showing structures of metastatic ovarian tumors. In two of these three, autopsy revealed gastric carcinoma; in the third instance further investigation was impossible because the patient was lost sight of. In the four remaining cases ovarian tumors were first recognized at the autopsy. Although most of the cases were advanced, yet the six autopsies contributed much evidence pertinent to the diagnosis. In all six primary carcinoma was found in the stomach; in four this finding was corroborated histologically. Three of the gastric carcinomas consisted of solid groups of epithelial cells, some with mucinous changes. One carcinoma (Case 7, Fig. 11) was fibrous and showed no mucinous transformation.

The ovaries in all cases presented typical uniform enlargement with preservation of the regular ovarian shape and indentations like the scars of a normally functioning ovary. The cut surface was generally solid except for a few discrete cysts. The solid tissue in some areas appeared gelatinous, grossly. Histologically the ovarian tumors in general presented the familiar Krukenberg structure, signet-ring cells arranged loosely or compactly between connective tissue rich in spindle-shaped cells. Two of the ovarian tumors presented irregular gland-like structures resembling adenocarcinoma, but in transition with groups of signet-ring cells.

In one instance (Case 6) the gastric carcinoma contained solid masses of round cells in partial mucinous degeneration, the stomach being free from adenocarcinomatous structure, but in the ovaries groups of mucinous cells occurred on the side of atypical glands. L. Gleize-Rambal and J. P. Robert[26] on the basis of similar observations, conclude that the tumor is of gastrointestinal origin, but we regard this evidence as not strong enough in itself to support the inference drawn. In Case 7 the histologic structure of the stomach was that of a fibrous carcinoma without mucinous transformation. These observations show that metastatic ovarian tumors presenting the gross appearance of the Krukenberg tumor may contain glandular structures like adenocarcinoma and that mucinous degeneration may be absent. The groups of epithelial cells can often be differentiated from the ovarian stroma except in certain cases when even the type of epithelial cells in the stomach cannot be established. Ewing[27] suggests that epithelial cells may be transformed into spindle-shaped cells.

The means by which tumor cells reach the ovaries has long been debated. One possibility, suggested by Bucher, is implantation. According to Frankenthal this way is most common if the gastric carcinoma already reaches the serosa. The carcinoma of the abdominal organs grows on the peritoneum and the desquamated or separating tumor cells sedimentate or are moved or propelled by intestinal peristalsis toward the ovaries, where they settle, after which penetration occurs. This theory is based in part on the work of Kraus[28] who discovered that India ink injected into the peritoneal cavities of rabbits appeared within three days in the ovarian substance. He concluded that the ink was taken up by wandering cells which pass through the germinal epithelium. Polano[29] affirms and Wolfheim[30] denies that corpuscular elements may pass through uninjured germinal epithelium. In Wolfheim's opinion the injected ink entered the lymphatics of the ovarian hilus and was taken up by cells. If the germinal epithelium is injured or if follicles are ruptured corpuscular elements may enter the ovarian substance. Kraus saw five cases of penetration of tumor cells from the ovarian surface into the substance. Müller,[31] Schlagenhaufer, Papaioanou[32] and Kohlmann[33] be-

lieve that ovarian carcinoma in cases of Krukenberg tumors result from implantation.

A second possibility is that cancer cells are carried to the ovaries in the blood. Ribbert[34] believes this to be the case with metastatic ovarian carcinoma. Kaufmann[35] in carcinoma of breast and of thyroid and Chiari[36] in carcinoma of the breast found accompanying ovarian carcinoma; in these instances transmission can have been performed by the blood only.

A third possibility is propagation of carcinoma to the ovary through the lymphatics. According to Kehrer, cited by Amann[37] a retrograde lymphatic communication exists between the stomach and ovaries; on this the cancer cells may proceed.

In our cases the ovarian surface was examined in several blocks. In no case could we recognize deposits of tumors in the surface layer, which usually presented fibrous connective tissue, the tumor being present only in the deeper part of the ovaries. In two of our patients despite carcinosis of the peritoneum the ovarian surface was free from tumor. In our cases it was inconceivable that the tumor cells reached the ovarian substance through implantation. We could follow the propagation of the carcinomas by way of the lymphatics. Metastases occurred in the lymphatic glands and lymphangitis cancerosa was observed. Therefore it seems to us that in the formation of ovarian tumors propagation through the lymphatics plays an important part, propagation along the blood vessels and implantation being distinctly less important.

How are these processes related in time? Would it be possible to prove from our observations the statement of Schauta that after gastric carcinoma, metastases are formed earliest in the internal genital organs? Since in our cases it was propagation along the lymphatic vessels that was most important, we must consider how tumor cells could travel along the lymphatic vessels and reach the ovaries. The tumor cells must suffer at least two interruptions in their course, first in the retrogastric lymphatic glands, then in the superior lumbar lymph glands. It is of no moment whether the tumor cells grow along the lymphatic vessels producing lymphangitis cancerosa or are carried by the lymphatic stream; it is hardly possible for them to pass without affecting at least two sets of opposing lymph glands, especially since the travel of the cell is retrograde. For this reason we can hardly believe that gastric carcinoma could give rise to metastases in the internal genital organs without affecting the lymph glands. It is more probable that at the time of ovarian infiltration the retrogastric and superior lumbar lymph glands are already carcinomatous. The examination of early cases would be necessary to decide this definitely. Friedrich Krukenberg was the first who observed the infiltration by carcinoma of the fallopian tubes in the case of metastatic

ovarian carcinoma. The frequency of this occurrence, as was said above, has been examined by O. Frankl. The crux of the matter lies here: what is the significance of infiltration of the tubes and uterus and how should it influence our procedure? Should one accept Frankl's recommendation of total extirpation for Krukenberg tumor in order that uterine carcinomatous lymphangitis may not be left behind? Parallel conditions are afforded by our own cases where carcinomatous infiltration had occurred in three instances in the tubes, in one instance in the vagina, and in three instances in the uterus. In all cases where the uterine wall showed carcinomatous infiltration similar infiltration occurred between the muscle fibers of the urinary bladder.

It would appear from the observation of our cases that total extirpation of the uterus would be justified only if carcinomatous lymphangitis occurred earlier in the uterus than in the other organs; i.e., if the supposition of Schauta were true and the internal genital organs (ovaries, tubes and uterus) possessed selectivity toward metastatic formation. Infiltration of the bladder follows simultaneously with infiltration of the uterus. Frankl described the hardening of the uterus as the result of carcinomatous infiltration. The same is true of the bladder; it shrinks and becomes hard. On the other hand the carcinomatous infiltration of the tubes, uterus and bladder is similar to the carcinomatous lymphangitis found elsewhere in the organism; e.g., in mesentery, pleura, or lungs. From the original gastric carcinoma metastases are formed in several places and probably certain local conditions which are the result of rich blood and lymphatic supply or hormonal influences cause greater growth of the carcinoma in the ovaries than in other organs.

In carcinomatous cases if metastases are formed the prognosis is bad. The same is true of Krukenberg tumors, except for the less frequent primary Krukenberg type. It is in our opinion hardly justifiable to remove the carcinomatous organs while at the same time other organs are also affected. Advanced carcinoma should be treated in that way only if with therapeutic measures we could reach the carcinoma as it propagates in the circulation or tissue spaces. This cannot as yet be done by surgical means, or, according to our present experience, by the roentgen rays. The future has yet to show how cures may be effected. We must try to recognize the carcinoma early and remove it by operation before ovarian metastasis has occurred, since when the ovaries have been reached, the lymphatics and perhaps other organs are already beyond surgical or roentgen assistance.

SUMMARY

Seven cases of Krukenberg tumors were studied, of which six followed gastric carcinoma, as proved by autopsy; in the seventh case origin of the tumor could not be determined. All cases presented

typical gross appearance; the microscope showed ovarian adenocarcinoma together with mucinous cells in two cases, in one case carcinoma fibrosum produced ovarian enlargement without mucinous degeneration. Evidence was collected of propagation of gastric carcinoma through retrograde retroperitoneal lymphatic means. It is improbable that ovaries are the first place of metastatic formation in cases of gastrointestinal carcinoma, nor do the uterus and appendages possess selectivity, since at the time of affection of the uterus infiltration is also to be observed in the bladder wall. Carcinomatous lymphangitis of the uterus, tubes and urinary bladder must be grouped with metastases of other organs. Removal of genital organs in cases of Krukenberg tumor should be looked upon as a palliative measure only, since at the time of these tumor formations the affection is too far advanced and is beyond possibility of radical cure.

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REFERENCES

(1) *Friedrich Krukenberg:* Arch. f. Gynäk., 1896, 1, 287. (2) *Richard Krukenberg:* Ztschr. f. Geburtsh. u. Gynäk., xli, 473. (3) *Leopold:* Arch. f. Gynäk., vi, 189, 249. (4) *Bucher:* Zieglar's Beitr., 1893, xiv, 71-141. (5) *Heinrichs:* Martin's Handbuch der Krankheiten der weiblichen Adnexorgane, 1899. (6) *Schlagenhaufer:* Monatschr. f. Geburtsh., 1902, xv, 485. (7) *Bode:* Sitzung der Drezdener gynaecol. Gesellsch. Ref. Zentralbl. f. Gynäk., 1895, 656. (8) *Fleischmann:* Bericht des Budapester Aerztevereins Zentralbl. f. Gynäk., 1896, 882. (9) *Temesvary:* Bericht des Budapester Aerztevereins Zentralbl. f. Gynäk., 1896, 883. (10) *Kötschau:* Gesellsch. f. Geburtsh. u. Gynäk. zu Koln Sitzung, Nov. 12, 1896, Zentralbl. f. Gynäk., 1897. (11) *Waldyer:* Virchow's Arch., 1867, xii, 470-552. (12) *Marchand:* Monatschr. f. Geburtsh. u. Gynäk., 1919, i, 117. (13) *Schenk:* Ztschr. f. Geburtsh. u. Gynäk., 1904, li, 277. (14) *Glockner:* Arch. f. Gynäk., 1904, lxxii. (15) *Sternberg, C.:* Zentralbl. f. Allg. Path., 1904, xv, 614. (16) *Walthard:* Ztschr. f. Geburtsh. u. Gynäk., 1903, xlix. (17) *Outerbridge, G. W.:* Am. Jour. Obst. and Dis. of Women and Children, Dec., 1914. (18) *Miller:* Tr. Edinburgh Obstetrical Society, Session lxxxvi, 1924-25, Edinburgh Med. Jour., March, 1925, 46. (19) *Major:* Surg. Gynäk. and Obst., 1918, xxvii, 195. (20) *Frankenthal:* Chirurgie, 1921, cxxiii, 600. (21) *Schauta:* Textbook. (22) *Neumann:* Arch. f. Gynäk., cxxii, No. 3. (23) *Ewing:* Neoplastic Diseases, W. B. Saunders Co., 1922. (24) *Schenk and Sitzenfrey:* Gleichzeitiges Carcinom des Magens der Ovarien und des Uterus mit besonderer Berücksichtigung ihrer Operativen Behandlung und der histologischen Befunde, 1907, lx. (25) *Frankl, O.:* Arch. f. Gynäk., 1920, cxiii, 29-132. (26) *Gleize-Rambal, L., and Robert, I. P.:* Compt. rend. Soc. de biol., March, 1925, xcii, 708. (27) *Ewing:* Neoplastic Diseases, 1922, W. B. Saunders Co., Philadelphia, p. 963. (28) *Kraus:* Monatschr. f. Geburtsh. u. Gynäk., 1901, xiv, 1. (29) *Polano:* Deutsch. Gesellsch. f. Gynäk., Dresden, 1907. (30) *Wolfheim:* Monatschr. f. Geburtsh., 1906, xxiv, 63. (31) *Müller:* Arch. f. Gynäk., 1892, xlii, 6, 387. (32) *Papaioanou:* Monatschr. f. Geburtsh., 1904, xx. (33) *Kohlmann:* Ztschr. f. Geburtsh. u. Gynäk., 1916, lxxix. (34) *Ribbert:* Das Carcinom des Menschen, Bonn, 1901. (34) *Kaufmann:* Path. Anat., 1922, 1233. *Chiari:* Wiener klin. Wchnschr., 1905, ix. (37) *Kahrer:* Cit. Amann. See Amann: München. med. Wchnschr., 1905, 2414.

ADDITIONAL REFERENCES

Aschoff, L.: Pathologische Anatomie Teil Spezieller, 1911, p. 609. *Belozor:* Vrach. Gaz., Petrograd, 1923, xxvii, 434-436. *Boudy, O.:* Centralbl. f. Gynäk., 1914, xxxviii, 375. *Borst:* Lehre von den Geschwulsten, Wiesbaden, 1902. *Bostroem:* Arch. f. Gynäk., xli. *Buchut et Morenas:* Cancer de l'estomac et cancer des ovaries. Lyon med., 1923, cxxxii, 936-940. *Burdansky, T. A.:* Centralbl. f. Gynäk., 1908, xxxii, 410. *Burazinsky:* Russ. Jour. f. Geburtsh. u. Gynäk, No. 1, p. 9. *Chapman, T. L.:* Surg. Gynec. and Obst., 1920, xxxi, No. 1. *Engelhorn:* Ztschr. f. Geburtsh. u. Gynäk., 1907, xi. *Gebhardt:* Path. Anat. der Weiblichen Sexual-

organe. *Gordon, O. A.:* Am. Jour. Obstet. and Gynec., 1924, viii, 120-122. *Hall, Morton E.:* Proc. of New York Path. Soc., 1912, xii, No. 3-4. *Hussy, P.:* Zentralbl. f. Gynäk, 1912. Ztschr. f. Geburtsh. u. Gynäk., 1911, xvi, 481. *Johannorosky:* Prag. Med. Wchnschr., 1877. *Koetschau:* Centralbl. f. Geburtsh. u. Gynäk., 1897, xxi, 627. *Kratzenstein:* Ztschr. f. Geburtsh. u. Gynäk., 1897, xxxvi, 61. *Kuhlhoff, K.:* Ein Fall von Fibrosarcoma ovarii mucocellulare carcinomatodes nach Krukenberg. *Lucke:* Deutsch. Chir. allg. Geschwulstlehre, 1896, xxxii. *Lyle, H. H.:* Ann. Surg., Philadelphia, 1911, liv, 625. *Mandl, L.:* Centralbl. f. Gynäk., 1913, xxxvii, 1786. *Miller, D.:* Tr. Edinburgh Obst. Soc., 1924-25, p. 46-51, in Edinburgh Med. Jour. March, 1925. *Mirabeau:* Perithelioma ovarii cysticum, Ebenda, x. *Montanelli:* Gynecologie, 1909, Fase. 17. *Momigliano, E.:* Arch. di ostet. e ginec. Napoli, 1925, xii, 193-230. *Offergeld:* Wurzb. abhandl., viii, 1910, xii. *Orthmann:* Centralbl. f. Gynäk., 1905, xxix, 272. *Pfannensteil:* Arch. f. Gynäk., 48. *Polano, O.:* Ztschr. f. Geburtsh. u. Gynäk., 1904, lx, 1. *Robischon:* Ueber Ovarial-ca. nebst Mitteilung zweier Falle von solchen Diss., Greifswald, 1895. *Reel, P. J.:* Interstate Med. Jour., 1917, xxiv, 520. *Rosinsky, B.:* Ztschr. f. Geburtsh. u. Gynäk., 1896, xxxv, 215. *Rosthorn:* Monatschr. f. Geburtsh. u. Gynäk., 1906, xxiv, 127. *Sacerdote, G.:* Arch. ital. di chir., Bologna, 1925, xiii, 614-628. *Sandrock, Wilhelm:* Inaugural dissert., Leipzig, 1906 (by Kuhlhoff). *Schestakoff:* Jour. akuscherstwa i schenkich bolesnei., 1914, xxix. *Schmincke:* Centralbl. f. Geburtsh. u. Gynäk., 1914, xxxviii, 484. *Schwartz:* New York Acad. Med., Sec. on Obst. and Gynec., April 24, 1913. Am. Jour. Obst. and Dis. Women and Child., 1913, p. 752. Women's Hospital, New York City, 1913. *Seeger, Rudolf:* Inaugural Dissertation Muenchen, 1888. *Sternberg, Carl:* Jahr. d. Wien. K. K. Krankenanst, 1896. *Stickel, Max:* Arch. f. Gynäk., 1906, lxxix, 605. *Stone, Wm. S.:* Surg. Gynec., and Obst., 1916, xxii, 407. *Temesvary:* Centralbl. f. Geburtsh., u. Gynäk., xxxvi, 61. *Tiburtius, Paul:* Inaugural Disser., Koenigsberg, 1 pr., 1899. *Ulesko-Stroganoff, K.:* Centralbl. f. Gynäk., 1910, xxxiv, 1049. *Waldeyer:* Arch. f. Path. Anat., 1872, lv, 130. *Welch, W. H.:* Bull. Johns Hopkins Hosp., 1893, iv, 99.

PREGNANCY FOLLOWING INVERSION OF THE UTERUS*

By Norman F. Miller, B.S., M.D., Iowa City, Iowa

(*Assistant Professor in Obstetrics and Gynecology*)

A NUMBER of observers have been interested in inversion of the uterus in recent years. This is evidenced by the amount of literature appearing on the subject from time to time. To my knowledge, however, none has taken up the subject from the subsequent pregnancy point of view. A recent case of this nature in the Obstetrical and Gynecological Clinic at the University of Michigan stimulated the writer to make an investigation of this subject, particularly from the standpoint of subsequent pregnancies.

In all, fifty-six cases were studied. This number includes the author's and fifty-five cases collected from available literature, and it would seem to be a fairly complete tabulation, since all possible leads or clues were followed in the search of records mentioning subsequent pregnancies. Fifty-five cases from such an enormous literature on inversion as the world presents today seem hardly correct. Certainly thousands of inversions have occurred and many of these women must have conceived later. Undoubtedly, they have gone unrecorded in the literature as is the way with many other interesting conditions.

*From the Department of Obstetrics and Gynecology, University of Michigan, Ann Arbor, Michigan.

The case reported here is that of a young woman, aged twenty-three. She was admitted to the Department of Obstetrics and Gynecology, University Hospital, on October 11, 1924. Her first baby was born in March, 1924. The confinement was entirely normal except for the third stage. Some difficulty was encountered in delivering the placenta, following which a complete inversion of the uterus occurred. The patient stated that she bled very profusely and that her condition was considered extremely serious for several days. As she gradually improved she noticed there was a continuous bloody discharge, generally slight in amount, but occasionally quite profuse. This, with persistent dragging sensation in the pelvis associated with frequent headaches, was her only complaint on admission.

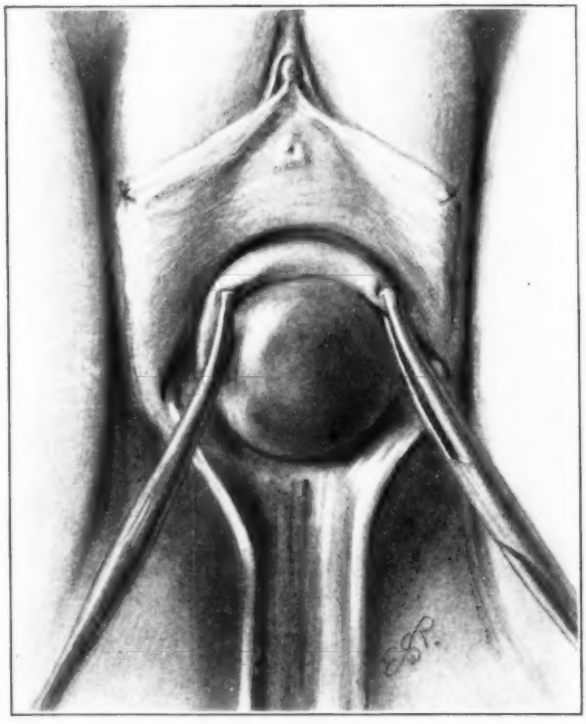

Fig. 1.

Examination showed a distinct round mass about the size of a duck's egg protruding through the cervical rim. The fundus could not be felt in the normal location. History and examination made the diagnosis obvious.

On October 17, 1924, the lesion was corrected by a slightly modified Spinelli operation, the steps of which are here briefly outlined. The upper cervical lip was grasped about one-half inch on either side of the midline with a volsellum forceps (Fig. 1), and a transverse incision about one inch in length made through the vaginal mucosa and fascia just below the bladder reflection. A sound in the bladder helped considerably in locating the desired point (Fig. 2). The bladder was then separated from the uterus by blunt dissection (Fig. 3), and the peritoneal cavity opened (Fig. 4). The appendages and the entire anterior wall of the uterus were then palpated by the examining finger (Fig. 5). An incision was next made

through the entire anterior cervical and uterine walls down to the top of the fundus (Fig. 6) and the uterus inverted by using the thumb and index finger of each hand (Fig. 7). The next step, an important one, was to remove a wedge or slice of uterine wall from each side of the incision. The inner or endometrial surface of the removed slice was fairly thick. This was done to permit better approximation of the uterine wound (Fig. 8). The uterine incision was closed by using interrupted chromic No. 1 catgut sutures, each suture going down to, but not through the endometrium (Fig. 9). The serous edges were then approximated with interrupted mattress sutures of the same material (Fig. 10). In order to take up some of the slack in the round ligaments, these structures were pleated upon the anterior surface of the uterus (Fig. 11). The repaired uterus was then pushed

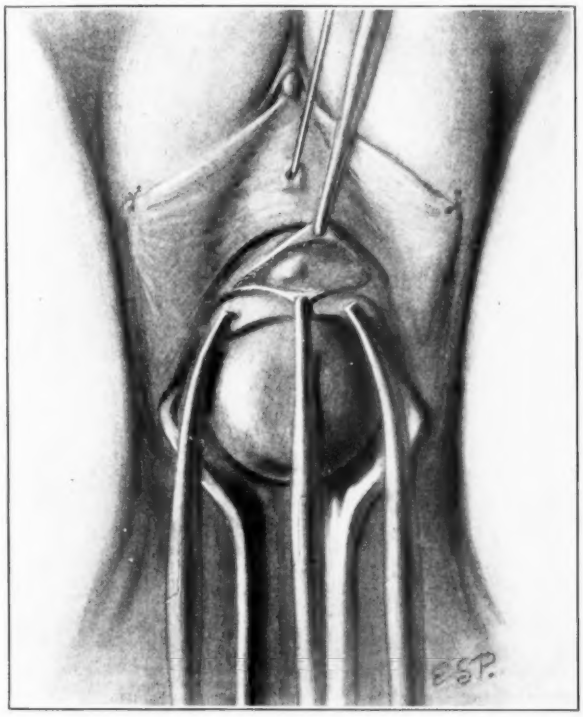

Fig. 2.

back into the pelvis and the peritoneal edges approximated (Fig. 12). The edges of the vaginal mucosa were then united from side to side (Fig. 13) in order to prevent foreshortening of the anterior vaginal wall.

The patient's convalescence was uneventful and she was discharged from the hospital two weeks later.

On several occasions during the next year the patient was re-examined and on September 28, 1925 she was readmitted to the clinic for confinement. On October 8, 1925 a normal male child weighing a little over six pounds was born. The labor was carefully watched and was perfectly normal in every respect, lasting only five and one-half hours. Examination of the cervix and uterus immediately following confinement revealed no evidence of the former operation. There was no abnormal condition of the anterior uterine wall noted; no cicatrix or abnormally thin

area could be found. Reexamination two weeks later revealed nothing abnormal or unusual. The puerperium was uneventful in every respect and the patient was discharged at the end of two weeks.

A study of the data obtained from this and reported cases revealed sufficient evidence to warrant several important deductions.

Etiology of Inversions.—I was particularly interested in noting whether any operative delivery or procedure preceded the inversion. Unfortunately, very meager information was available on this subject. In one instance a coil of cord around the baby's neck was reported,

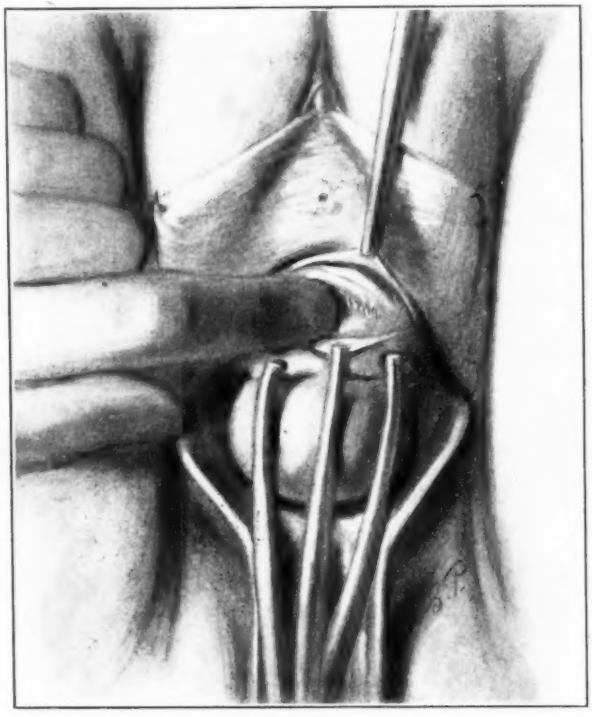

Fig. 3.

Sweeney.[45] In two cases, Valdez[50] and Corruthers,[6] the inversion followed forceps delivery. Were the data available, it would be interesting to note the rôle played by the various methods of operative delivery, and more particularly by manipulations in the third stage of labor. Such procedures as traction on the cord, Credé expression of the placenta undoubtedly played an important part in the etiology, but probably the factor most responsible was the congenital weakness of the uterus, stressed by many writers on the subject.

All of the fifty-six cases reported became pregnant once or oftener after the original inversion. Exact information as to the number of pregnancies following inversion will, obviously, never be available.

It is doubtful whether the small number of reported cases is a fair indication as to the actual frequency of subsequent pregnancies following inversion. If correct, however, it may be explained partly by the advice given by the attending physician regarding dangers of future pregnancies. It is conceivable that these dangers may have been very greatly stressed in those cases where the correction was by operative means. Just how prominent cesarean section has been in the treatment of these cases during subsequent pregnancies is un-

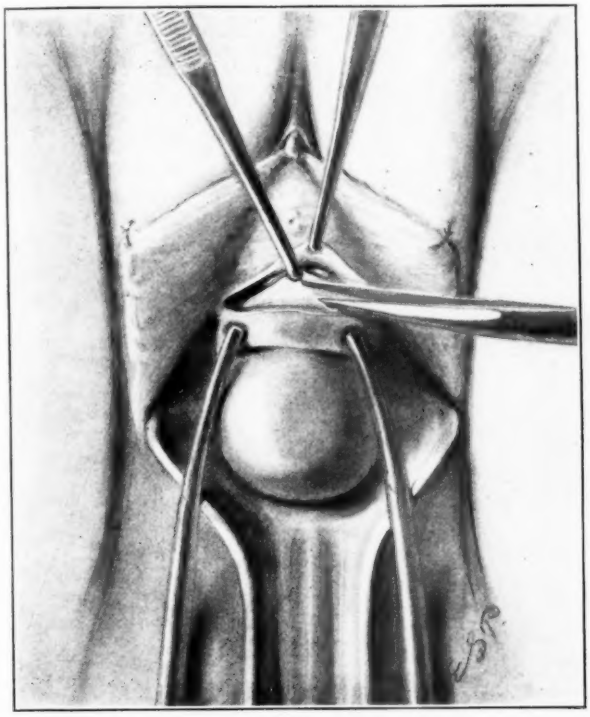

Fig. 4.

known. Possibly cases delivered by this method have been considered unimportant and therefore unrecorded.

Age.—Of the fifty-six cases studied, the youngest recorded was a patient eighteen years of age. This case was reported by Dahlgren.[8] The original inversion existed six weeks before it was repaired by Piccoli's incision. Two subsequent pregnancies occurred. Both terminated normally. The oldest case in this group, reported by Heinricus,[16] was a woman aged thirty-seven. The inversion was of eleven months standing. It was also repaired by Piccoli's incision. One child was born nine years and nine months later. The confinement was normal.

Parity.—In this group there were sixteen recorded as primiparae; twenty-one multiparae and in nineteen the parity was not stated. In the group of multiparae there were eleven para-ii, three para-iii, four para-iv, one para-vi, one para-xi, and one simply recorded as a multipara. The slight preponderance of the multiparae over primiparae would tend to bear out many of the existing opinions on the greater incidence of inversion among multiparae. The difference is not sufficient, however, to warrant any conclusion other than that already mentioned.

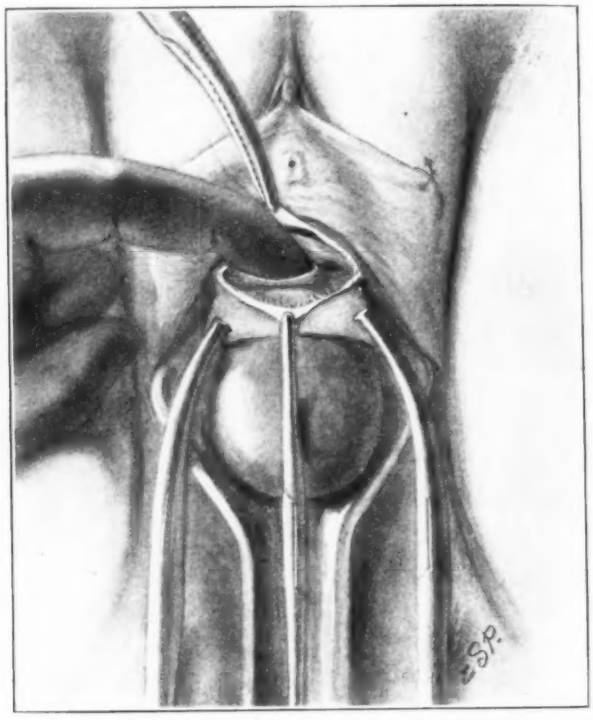

Fig. 5.

Duration of Inversion before Correction.—In the group of cases corrected manually, the average duration of the inversion was approximately thirty-three days. It must be stated, however, that fifteen of this group were corrected immediately. The longest interval in this group was twelve months. This case reported by Sims had a spontaneous inversion of the uterus some time after confinement. It existed about twelve months before it was corrected manually. In not all instances where manual correction was employed was the duration of the lesion mentioned. Were it not for two cases, the one of the twelve months' duration, Sims,[42] and one of seven months' duration, Emmet,[10] the average length of time in this group would be ten days,

which is a much more reasonable figure. It might well be assumed that the actual number of manual replacements is considerably less as the duration of the lesion lengthens. Manual reduction becomes proportionately more difficult as the lesion continues and involution with contraction of the cervix may render manual reduction entirely impossible.

In the group undergoing spontaneous correction we found the average duration was, curiously enough, nine hundred and sixty-nine days or thirty-two months. A further interesting fact in this group was

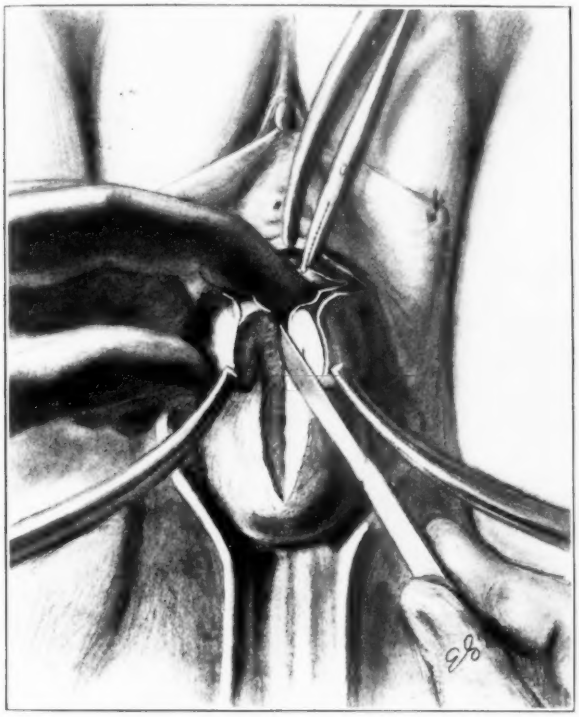

Fig. 6.

that several of these spontaneous replacements occurred after other methods had been tried. Thus, four occurred after numerous unsuccessful attempts at manual reduction had been made, McCullagh,[26] Meigs,[34] Stevens,[44] Tyler-Smith.[49] One case underwent spontaneous reduction after Aveling's repositor had been used in vain, McCullagh.[26] The explanation of this rather unexpected finding is not entirely clear. Possibly attempts at reinversion were made while the uterus was still markedly congested and edematous, and later as involution slowly occurred and the edema disappeared, nature was able to repair the lesion without assistance. Certainly, it reveals the ever-

present tendency on the part of nature to maintain constantly or bring about the normal.

In the group corrected by operation, numbering twenty-two, the average time or duration of the lesion previous to correction was two hundred and seventy days or nine months. The longest duration in any one case in this group was five years (Born[2]) and the shortest, four days (Walponer[51]). Quite a wide variety of operative methods were recorded—some more simple than others,—and it seems that the choice of operative procedure must depend on the indi-

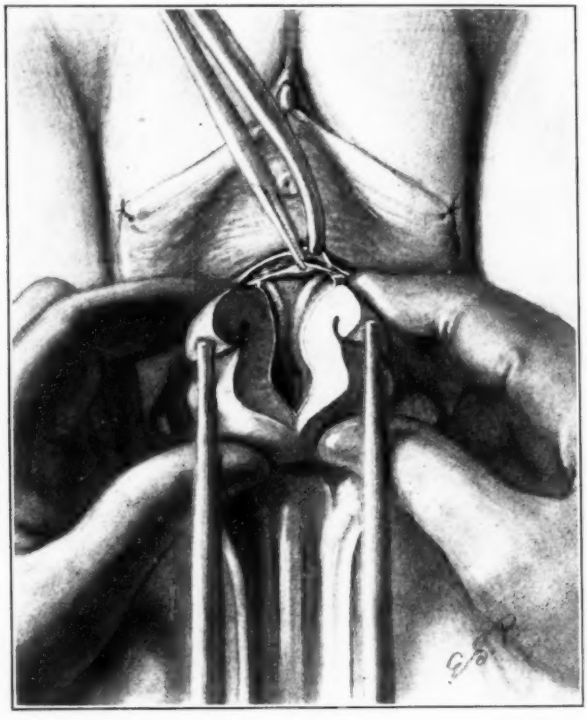

Fig. 7.

vidual case and on the operator's idiosyncrasies. It is apparent that some inversions are easily corrected and require little in the way of operative work, while others are more difficult and naturally will require considerably more in the way of surgical procedure. It would appear desirable, however, that more effort be made to standardize the operative treatment, for it is only by so doing that best results can be obtained.

Methods of Correction.—Of the fifty-six cases studied, in only fifty-five was the method used in correcting the inversion recorded. In these fifty-five, twenty-five were replaced manually. One of these, however, had the help of an air pessary, Tyler-Smith,[49] and another

the aid offered by astringent douches, Sweeney.[45] Eight cases were spontaneous in their replacement. One of these followed an attempt at replacement by means of Aveling's repositor, McCullagh.[27] There were twenty-two operative corrections. Of this number eight were corrected by Piccoli's incision; two by the combined Piccoli-Borelius-Westermann method; five by the Spinelli operation; three by the Küstner operation; one by the Küstner-Borelius-Westermann operation; one each by the Kehrer's and Duret's method and one by the Aveling repositor.

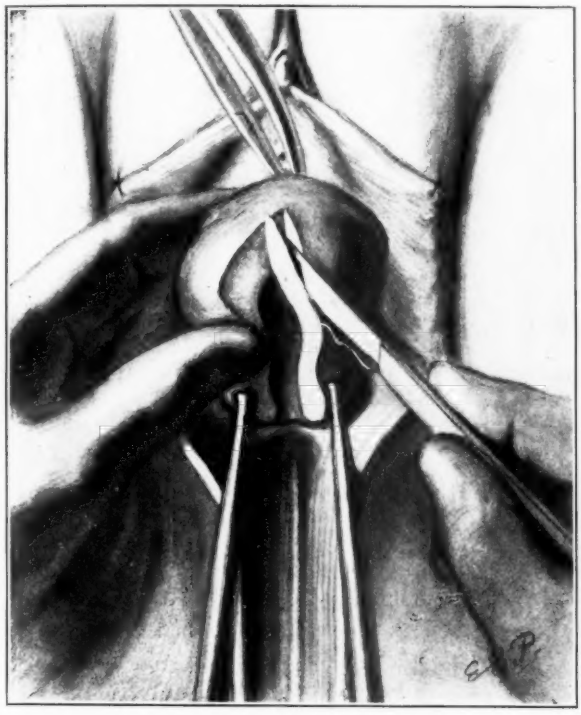

Fig. 8.

Those interested in the technic of these various operative procedures are referred to the very excellent articles on the subject by Dr. Reuben Peterson.[56]

Subsequent Pregnancies.—The greatest number of reported subsequent pregnancies following the original inversion in any one case was five. The patient, a woman of twenty-four, reported by Emmet,[10] had five normal pregnancies following the original inversion, without recurrence of the lesion. Very likely more than five pregnancies have occurred in women who have had an inversion, but none are recorded in the literature.

Number of Recurrences with Subsequent Pregnancies.—In eight cases where spontaneous cure occurred, two had a recurrence of the inversion with a subsequent pregnancy, Mayer,[32] and Stephens.[43] The first was corrected manually and the other underwent spontaneous reduction two months later after manual reduction had been attempted. Of those manually corrected, twenty-five in all, eleven, or 44 per cent, had a recurrence of the inversion with subsequent pregnancies, Corruthers,[6] Crosse,[7] Fritsch[11] (two cases), Furst,[12] Gilbert,[13] Huber,[18] Kuhlbrand,[25] Nijhoff,[37] Philips,[38] and Schönbek.[40] In the twenty-two cases cured by operation, not one recurrence was noted, a very note-

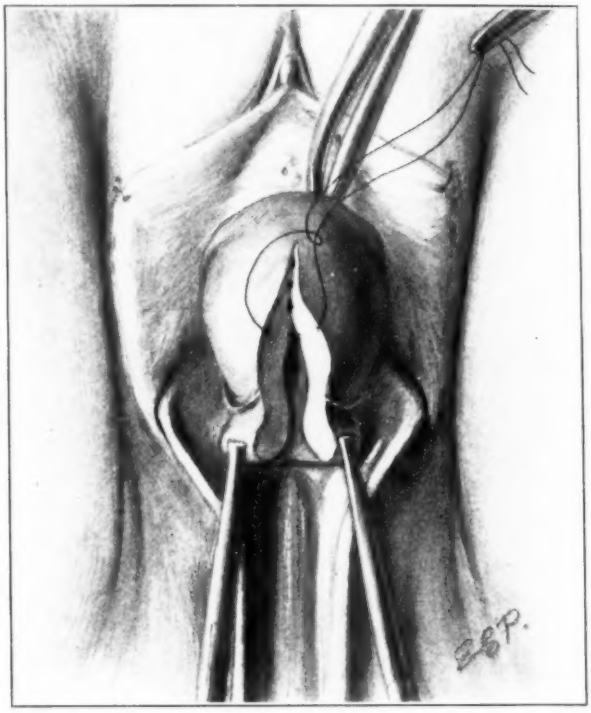

Fig. 9.

worthy fact when compared with the eleven recurrences in the group of twenty-five manually corrected cases. One other case of recurrence was reported, but the original method of correction was not mentioned. Valdez.[50] In all, there were fourteen recurrences, or approximately 33 per cent of all inversion cases recurred with subsequent pregnancies. In this study not one of the recurrences followed operative repair. Unless this is clearly understood, the frequency of recurrences (33 per cent) is apt to be very misleading.

Abortions.—Only three abortions were reported in the entire group of fifty-six cases. One occurred in an operative case corrected by

Duret's method, Beloustegui,[3] one in a spontaneously cured case, Meigs,[34] and the third in a case corrected by manual manipulation, Nijhoff.[39]

Adherent Placenta in Subsequent Pregnancies.—Sixteen of the forty-two cases, or 38 per cent, where puerperal complications were recorded, had an adherent placenta with the next confinement. Ten of this number occurred in the twenty-five manually corrected cases, Meigs[33] (two cases), Manton,[30] Philips,[38] Schönbek,[40] Kain,[20] Fürst,[12] Fritsch,[11] Corruthers,[6] Stephens,[43] Wilson.[54] Also once after each of

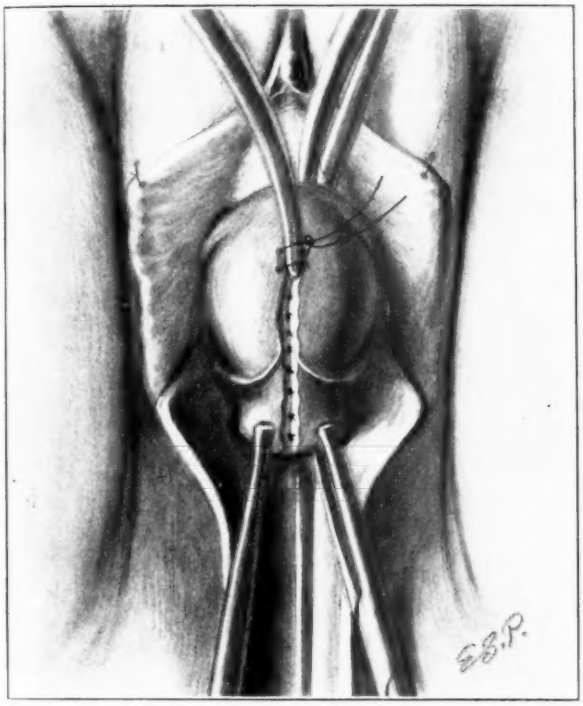

Fig. 10.

the following operations: Piccoli, Duret, Küstner and Piccoli-Borelius-Westermann. One adherent placenta occurred in the group of eight spontaneous corrections, Stephens,[43] and in one case the method of correction was not given, Valdez.[50] Again an interesting condition is revealed in that 40 per cent of all manually corrected cases are associated with an adherent placenta, while only 18 per cent of cases corrected by operation had a similar complication. The explanation is not easy, since one would expect at least as many predisposing factors present in operative cases as in those manually corrected. Low grade infection of the uterus probably accounts for many, and we might well expect even a greater frequency in the operative group

for that very reason. In the operative group there is the additional factor of the scar to be considered.

Hemorrhage.—Serious postpartum bleeding occurred in six out of forty-two cases, or 14 per cent; three times in manually corrected cases, Gilbert,[13] Nijhoff,[37] Schönbek;[40] twice in the operative group, Duret,[9] and Born;[2] and once in a spontaneously corrected case, Tyler-Smith.[49] With a percentage of 26 for recurrence, this would seem unusually low. Serious hemorrhage probably occurred in most cases of recurrence as well as in some of the sixteen with adherent placenta.

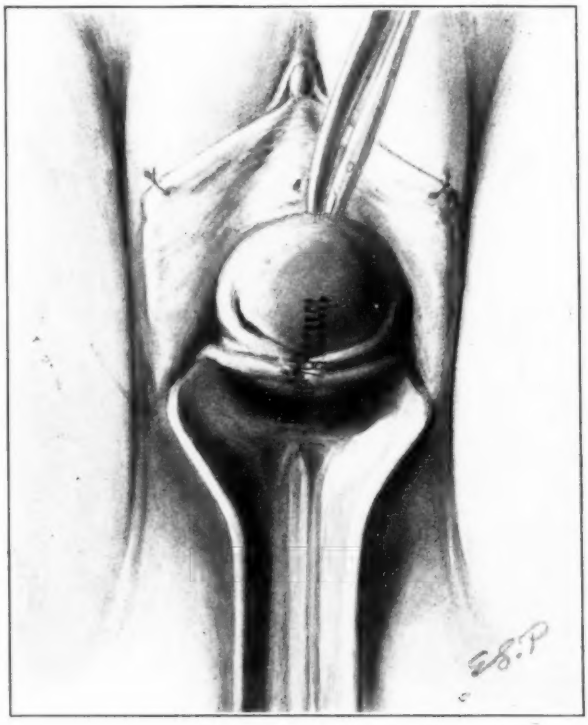

Fig. 11.

Probably the above mentioned figure does not correctly represent the frequency of this complication.

Morbidity and Mortality.—The end-results were strikingly good. Of the forty-two reports recording end-results only two cases of sepsis were noted, or 4.6 per cent. One of these died, Küstner,[24] the only death in the entire group (2.4 per cent). This death occurred four days after confinement. The patient had been cured of her original inversion by Küstner's incision three years previously. The other had a total inversion following labor three years after the original inversion, Huber.[18] Peritonitis and metritis followed but subsided eventually.

From the standpoint of morbidity and mortality, probably the most important and striking feature, outside of the low sepsis and mortality rate, is that not a single instance of ruptured uterus was recorded. In the entire group of twenty-three cases corrected by operative means (in one case the exact method was not given) at least twenty-nine confinements occurred and in not one did rupture occur. This is quite contrary to the present feeling regarding incision in the uterus and the subsequent dangers of rupture.

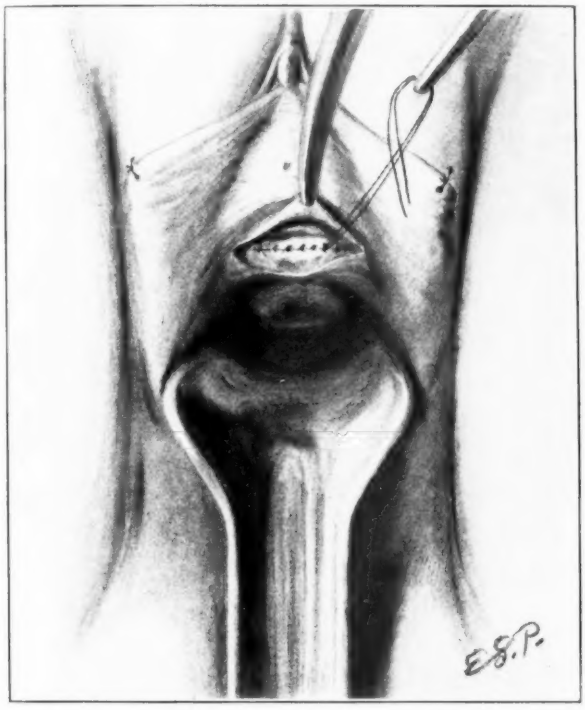

Fig. 12.

Management of Pregnancies Following Inversion of the Uterus.—It would appear from the information presented that conservative treatment with the hope of a normal confinement is the treatment of choice. Cases with a history of manual reduction of the inversion should be particularly watched for complications such as recurrence, adherent placenta and hemorrhage. Proper precautions by preparing for any of these emergencies should be taken. Curiously enough, where a history of operative correction is given, an uncomplicated confinement may, as a rule, be anticipated. While the possibility of rupture of the uterus must be considered, the chances of its occurring are probably slight. The dangers from this source in cases with a history of operative repair are probably greatly exaggerated. The necessity of advis-

ing cesarean section for subsequent pregnancies in this type of case would appear slight. In fact, the evidence is entirely in favor of a normal confinement in the operative group. In either instance, the facilities of a well established maternity should be available. To confine such a patient in the home when the best facilities are now within the reach of people in all walks of life, would, indeed, be seeking trouble.

It would seem desirable to discuss here the methods of correcting the original inversion. It is only by study of these methods and the

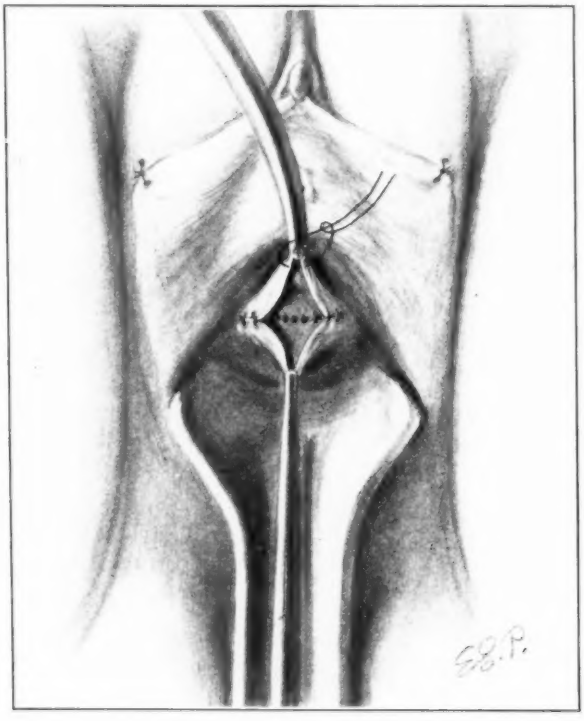

Fig. 13.

results obtained that the best method of correcting the lesion can be determined.

The methods of treatment in the past have been quite numerous and include all types of operative repair as well as manual reduction. In spite of the many types of operative correction, the end-results in this group are far better than those of the manually reduced group. This is particularly surprising when we consider the variety of operations used and that many of these must have been the first performed by the operator. It is conceivable that many minor defects could have been avoided had the operator had more experience in this type of case and were the operative methods standardized. In spite of the

above, however, all of the postpartum complications were more frequent in the manually treated or nonoperative than in the operative group. It seems that one of the best methods of repair is the Spinelli operation. In the group of five cases corrected by the Spinelli method not a single complication occurred with subsequent pregnancies, and yet one of this group had four subsequent pregnancies, one had two, and three had one each. Any attempt at comparison of the various operative procedures is obviously unfair, since so few cases have been repaired by any one method. Judging from available data, however, the Spinelli operation would appear to be the best.

While the results in cases corrected by operation are far superior in so far as future pregnancies are concerned, it is apparent that this procedure can never be the one of first choice. In acute cases, manual reduction will probably always be attempted first with the hope of relieving the condition as quickly as possible as well as to prevent the serious symptoms usually accompanying a chronic inversion. Where manual reduction is impossible, however, or where the patient is first seen with a chronic lesion, operative repair should be advised.

In reconsidering, it seems: (1) that recurrence of the inversion is more apt to occur in women of greater parity; (2) that quite a variety of methods are used in correcting inversion of the uterus and an attempt should be made to standardize the operative treatment; (3) that the Spinelli operation gives probably the best results of any operative procedure; (4) that the chance for recurrence of the lesion is approximately 44 per cent in cases corrected manually, while in cases corrected by operative means, the chances are very slight (not one case of recurrence was recorded in those originally corrected by operation in this group); (5) adherent placenta occurs frequently, being found in 18 per cent of all operative cases, 40 per cent of all manually corrected cases, or in 38 per cent of all cases; (6) serious postpartum hemorrhage is probably more frequent than the evidence would lead us to believe. It occurred in 14 per cent of all cases at the time of subsequent confinement; (7) sepsis does not occur as often as one would expect, resulting in only two cases in this group or in 4.6 per cent; (8) fatal termination occurred in one case or in 2.4 per cent; (9) the dangers of ruptured uterus in subsequent pregnancies where the original lesion was corrected by operative means is greatly exaggerated; (10) the treatment should be conservative, but measures should be taken to cope with any complication; (11) cesarean section in these cases seems unwarranted, but, if considered, is more applicable to those manually reduced than to the operative group.*

*NOTE: Brief summaries of all of the cases analyzed in this report will be included in the author's reprints.

REFERENCES

(1) *Aytoun, J. H.:* Lancet, 1912, ii, 1580-1581. (2) *Born, H.:* Zentralbl f. Gynäk, 1907, xxxi, 109-110. (3) *Beloustegui:* Semana Med., 1913, xx, 1314. (4, 5) *Buck, M. J.:* Surg., Gynec. and Obst., 1914, xix, 487-489. (6) *Corruthers, N. S.:* Brit. Med. Jour., 1915, i, 676-677. (7) *Crosse, J. G.:* Tr. Prov. Med. and Surg., Assn., 1845, i, 285-350; idem, 1844, viii, 155; Braithwaithe's Retrospect, 1844, x, 201-204. (8) *Dahlgren, K.:* Hygeia, 1905, v, 474-480; Abst. Brit. Gynec. Jour., xxi, 130. (9) *Duret, H.:* Paris Thesis, 1899-1900, No. 844. (10) *Emmet, T. A.:* Principles and Practice of Gynecology, 1879, Phil. (11) *Fritsch, H.:* Zentralbl. f. Gynäk, 1907, xxxi, 427-429. (12) *Furst, C.:* Wiener Klin. Wchnschr., 1899, ii, 8-11. (13) *Gilbert, E.:* St. Petersb. med. Wchnschr., 1901, xviii, 29-35; Centralbl. f. Gynäk., 1901, xxv, 755. (14) *Graeve, H.:* Centralbl. f. Gynäk., 1899, xxiii, 911-913; Hygiea, 1906. (15) *Gummert, L.:* Monatschr. f. Geburtsh. u. Gynäk., 1889, ix, 127. (16) *Heinricius, G.:* Prakt. Ergebn. a. d. Geburtsh. u. Gynäk., 1910, ii, 67-84; Arch. f. Gynäk. 1901, lxiii, 606-642. (17) *Hillman, H.:* Monatschr. f. Geburtsh. u. Gynäk., 1922, lix, 44-55. (18) *Huber, W.:* Med. Chir. Centralbl., 1889, No. 8; Centralbl. f. Gynäk., 1889, 13, 805. (19) *Jonas, A. F.:* Jour. American Med. Assn., 1900, xxxiv, 23-24. (20 *Kain, J.:* Tr. Pest. Med. Chir. Presse, 1901, xxxvii, 541-544; Samml. klin. Vortr., 1909, No. 625-627; 101-209. (21) *Kehrer, F. A.:* Westf. Gesel. f. Gyn., 1898, xiii, 11. (22) *Keilmann, A.:* Zentralbl., f. Gynäk., 1909, xxxi, 359-361. (23) *Kirkham, H. L. D.:* Am. Jour. Obst., & Gynec., 1915, lxxii, 312-319. (24) *Küstner:* Centralbl. f. Gynäk., 1893, xvii, 945-948. (25) *Kuhlbrand:* Gaz. med., 1839, x, 653-654. (26, 27) *McCullagh, W. M. H.:* Am. Jour. Obst. and Gynec., 1925, xxxii, 280-297. (28) *Maduhuginsky, A. S.:* Med. Obozr., 1912, lxxvii, 847-853; Centralbl. f. Gynäk, 1913, 37-189. (29) *Mann:* Dublin Med. Jour., 1838, xii, 7-25, 215-224. (30) *Manton, W. P.:* New York Med. Jour., 1921, cxiv, 397-399. (31) *Mars:* Lemberger artzliche Gesellschaft, Jan. 12, 1912. Nowiny Lekarskie, 1912, 303 (von Neugebauer). (32) *Mayer, J.:* Prag. med. Wchnschr., 1901, xxvi, 53-55. (33, 34, 35) *Meigs, C. D.:* Females and Their Diseases, Phil., 1848. (36) *von Neugebauer, F.:* Centralbl. f. Gynäk., 1913, xxxvii, 529-536. (37) *Nijhoff, G. C.:* Nederl. Tijdschr. v. Geneesk, 1901, 2 R., xxxvii, 1162-1166. (38) *Philips, T. B.:* Nederl. Tijdschr. v. Geneesk, 1922, i, 2059-2060. (39) *Rönnholm:* (See Heinricius 16). (40) *Schönbek, A.:* Zentralbl. f. Gynäk., 1908, xxxii, 1038-1040. (41) *Searle, A.:* Am. Med. Times, 1861, ii, 169-170. (42) *Sims, J. M.:* Uterine Surgery, 1886. (43) *Stephens, L. C.:* Obst. Jour. Gt. Brit. and Ireland, Am. Supp., 1877, 49-50. (44) *Stevens, E. J.:* Bost. Med. and Surg. Jour., 1879, c, 251-254. (45, 46) *Sweeney, R. L.:* Ohio State Med. Soc. Tr., 1865, xx, 38-47. (47) *Talens, D.:* Semana med., 1913, xx, 1314-1315. (48) *Thorn, W.:* München med. Wchnschr., 1900, xlvii, 856-860. (49) *Tyler-Smith, W.:* Med.-Chir. Tr., 1858, xli, 183-192. (50) *Valdez, B.:* Rev. Filipina de med. y farm, 1913. Philippine Med. Assn. Jour., 1924, iv, 97-99. (51) *Walponer, E.:* Zentralbl. f. Gynäk., 1918, xlii, 318; Wiener med. Wchnschr., 1918, xxxi, 1009. (52) *Westermark, F.:* Centralbl. f. Gynäk., 1899, xxv, 106-109. (53) *White, J. P.:* Intern. Med. Cong., 1876, 877-878. (54) *Wilson, H. C.:* Brit. Med. Jour., 1924, ii, 88. (55) *Judd, A. M.:* Am. Jour. Obst. and Gynec., 1926, xi, 413. (Also personal communication, September, 1926.) (56) *Peterson, E.:* Surg., Gynec. and Obst., 1907, pp. 196-213; Am. Gynec., 1903, pp. 489-507.

INTRAMURAL ABSCESS OF UTERUS, WITH REPORT OF A CASE

By David Feiner, M.D., Brooklyn, New York

Associate Gynecologist and Obstetrician, Beth Moses and Israel Zion Hospitals; Adjunct Pathologist, Beth Moses Hospital

THE writer has been prompted to elaborate briefly upon the condition herein described, because of the fact that a careful search through textbooks on gynecology and obstetrics shows little or no mention of the subject; furthermore, it is quite certain that intramural abscess of the puerperal uterus occurs with much greater frequency than the reported case and autopsy records would indicate.

Barrows[1] states as his belief that the explanation of this apparent oversight lies in the fact that the condition under discussion has been confused with other inflammatory disturbances of the pelvic organs, and has in this way escaped the attention which it deserves.

In the year 1901, von Franque[2] reviewed the subject of uterine abscess in an excellent monograph. He collected from the literature only fifteen authentic cases, of which seven were of puerperal origin. The article contains abstracts of all the authentic cases, also the doubtful ones. In 1906, Noble[3] reported four cases of abscess of the puerperal uterus, making eight in all which had occurred in his practice. He collected eleven others from the literature, which, with the eight, he arranged in tabulated form.

In 1907, Mercade[4] published a review of the literature of uterine abscess, in which he stated that from a very exhaustive study of the same, he succeeded in locating forty-one authentic cases, of which twenty-two were of puerperal origin.

Sampson[5] published a valuable contribution to the subject in a detailed report of the diagnosis and treatment of four cases of puerperal origin, occurring in his practice.

In 1911, Barrows[1] reported an excellent description of a series of seven cases, coming under his immediate observation.

Since the papers of Sampson and Barrows, I have been able to find only a few isolated cases reported. However, these two aforementioned groups have been considered of sufficient interest to warrant brief abstracts.

Sampson. Case 1.—Intramural abscess (streptococcus) of the left uterine cornu resulting from puerperal infection following instrumental delivery, abscess incised and drained extraperitoneally—appendages normal. Recovery.

Case 2.—Intramural abscess (streptococcus) of the right uterine cornu resulting from puerperal infection following normal delivery—abscess incised and drained transperitoneally. Recovery. Adnexa normal. Normal labor and puerperium, twenty months later.

Case 3.—Multiple abscesses of the uterus, ovaries, bladder wall, and pelvic connective tissue—purulent pelvic peritonitis and thrombophlebitis—(streptococcus and

colon) resulting from puerperal infection following criminal abortion. Death on the twenty-third day. The author (Dr. Sampson) ventures as his opinion the statement that an early operation in this case, by which the pelvis could have been filled with gauze, and drained through the culdesac, would probably have offered the best chance for recovery.

CASE 4.—Multiple abscesses of the uterus, right ovary, and bladder wall, encapsulated purulent peritonitis (retention abscesses) and thrombophlebitis of the right ovarian veins (streptococcus) resulting from puerperal infection following manual delivery. First operation, multiple incisions and drainage,—as the patient did not improve after four weeks, but continued to run a septic temperature, a second operation was performed, supravaginal hysterectomy, bilateral salpingo-oophorectomy, ligation of right ovarian vessels at the pelvic brim, recovery.

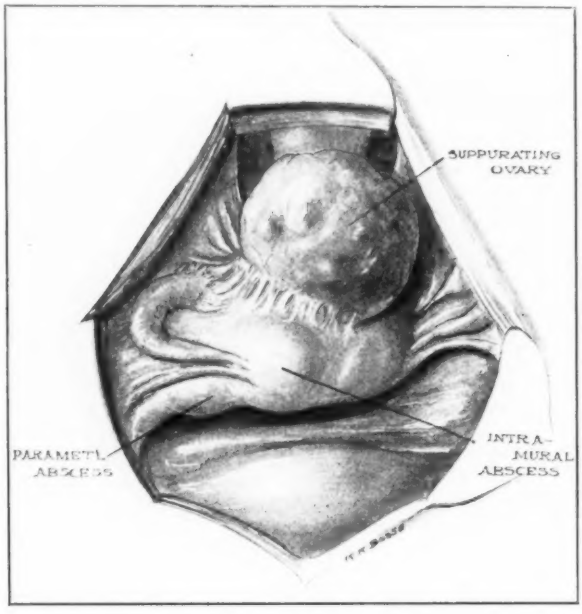

Fig. 1.—Posterior aspect of uterus, showing abscess formation in uterine wall, parametrium and ovary.

BARROWS. CASE 1.—Intramural abscess (streptococcus) near right uterine cornu following intrauterine operation (exact nature unknown) two weeks after normal labor. Incision, transperitoneal, suprapubic drainage, recovery.

CASE 2.—Intramural abscess (streptococcus) at right uterine cornu, six weeks after normal delivery. Incision, transperitoneal, suprapubic drainage, recovery.

CASE 3.—Puerperal (streptococcus) intramural abscess in left upper anterior portion of uterine wall, dissecting anteriorly between the folds of the broad ligament to pelvic wall. Incision, drainage, recovery.

CASE 4.—Puerperal abscess of anterior uterine wall (streptococcus) dissecting between uterus and bladder. Anterior colpotomy, vaginal drainage, recovery.

CASE 5.—Intramural abscess of uterus (streptococcus) the result of puerperal infection * * * * Incision, drainage, treatment by autogenous streptococcus vaccines. Recovery.

Case 6.—Abscess of the uterus, puerperal (streptococcus). Treatment by incision and drainage, autogenous and antistreptococcus vaccines. Recovery.

Case 7.—Intramural uterine abscess (gonococcus). Treatment by incision and drainage, antigonococcus vaccine. Recovery.

As regards treatment, the consensus of opinion of those who have written upon the subject favors surgical drainage, the same to be held in abeyance until after the acute inflammatory symptoms have subsided, preferably by the abdominal, occasionally by the vaginal, route. Where multiple abscesses are present, or even one abscess with extensive involvement, hysterectomy is indicated. In selected cases, after the

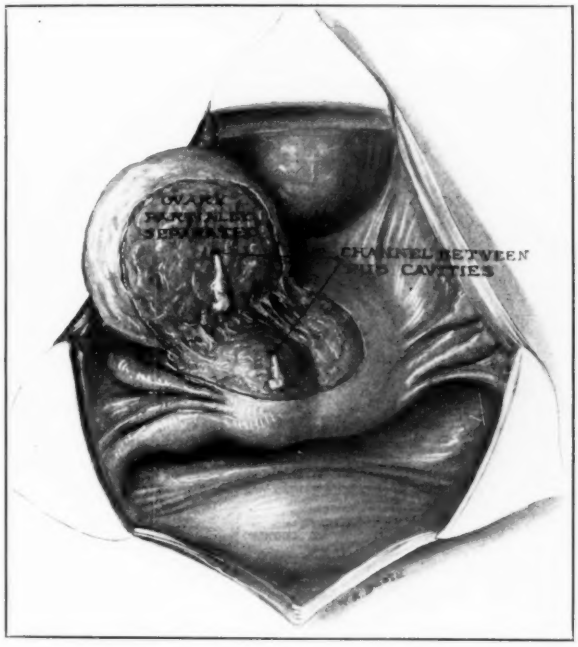

Fig. 2.—Showing ovary partially separated.

abdomen has been opened, the abscess may be drained through the uterine cavity, or extraperitoneally through the layers of the broad ligament.

Case Report.—Mrs. M. D., admitted to gynecologic service, United Israel Zion Hospital, Dec. 22, 1925, thirty-eight years of age, married fifteen years, para vii, youngest child 10 months, one miscarriage, six years ago, no curettage.

Menstrual history: Began at fifteen, regular, twenty-eight day type, six days duration, no dysmenorrhea, moderate flow. Last period, Oct. 15, 1925. Did not menstruate in November. After waiting a few days, she began taking hot baths and some "medicine." On December 5, three weeks later, she began to bleed rather profusely, passed some clots, and had abdominal cramps. The bleeding lasted four days, then ceased entirely, until three days before admission. She used lysol douches

occasionally, in the interim, and took some more "medicine." During this entire period, she suffered from severe pain in the right flank, radiating anteriorly to the right lower quadrant; morning nausea had been present since October 15. On December 26, three days before admission, patient began to bleed again, following a lysol douche. This was accompanied by chilly sensations and some fever. At no time was there any attack of syncope, or sudden sharp pain in the abdomen. (After the patient had been in the hospital several days, she finally admitted that a criminal abortion had been performed upon her eight days before admission.)

Chief complaint: Vaginal bleeding; pain in right lower quadrant. Examination revealed an adult female patient lying quietly in bed, apparently not in severe pain. General physical examination, negative. Abdomen slightly distended. Liver and

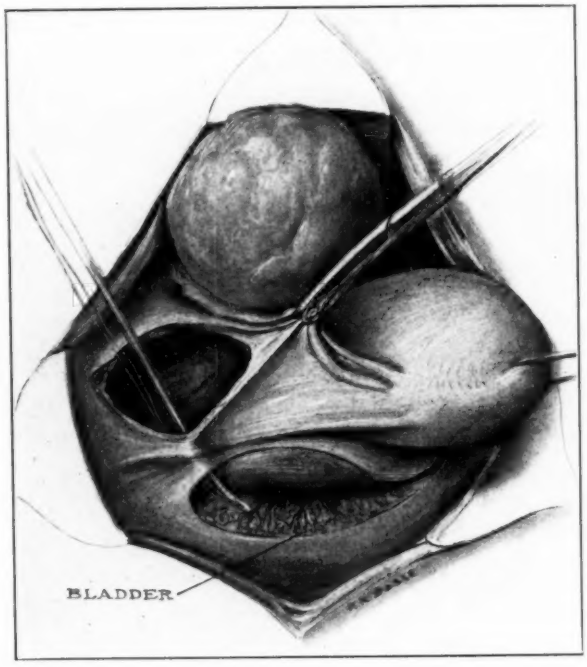

Fig. 3.—Operative procedure, right infundibulopelvic ligament divided, parametrial fossa exposed, bladder separated downward, extreme vascularity of bladder wall indicated.

spleen not palpated. Slight tenderness elicited in both lower quadrants and above symphysis. No rebound tenderness present. Lower pole of right kidney palpable, but not tender. Temperature 102°, pulse 112, red blood cells 3,800,000, hemoglobin 80 per cent, white cells 15,400, polynuclears 86 per cent. Diagnosis: Incomplete abortion, with possibly an associated tuboovarian condition.

Following day, December 30, temperature dropped to 100°, pulse 90. Tenderness over hypogastric region less marked.

December 31. Temperature and pulse normal. Bleeding stopped. No pelvic pain, tenderness, or abdominal masses now discernible. General condition, good.

January 2. Temperature, pulse, respiration normal, abdomen soft, no masses or tenderness, no vaginal bleeding, general condition, very good.

January 4. Temperature 99.4. Pulse 90, complaining of slight pain in pelvic region. No tenderness on palpation. Slight vaginal bleeding.

Vaginal examination: Good pelvic floor and cervix; uterus enlarged to the size of eight weeks' pregnancy; pushed slightly over to the left side, tender on manipulation. A doughy mass, size of tangerine orange, moderately sensitive, and firmly attached to the uterine wall, palpated on the posterior median surface of the latter, suggests subserous fibroid, possibly degenerating.

January 6. Vaginal exploration: Cervix found patent and soft; sound passes to depth of three inches in direction of left side, because of prominence impinging into uterine cavity from right wall. Light curettage brought out small amount of broken down decidual tissue and old blood clots. Iodine strip left in cervical canal.

Laparotomy: Upon entering peritoneal cavity, moderate amount of straw-colored free fluid found. Uterus enlarged to size of eight weeks' pregnancy, somewhat irregular in outline, owing to bulge in right wall. The right ovary, which

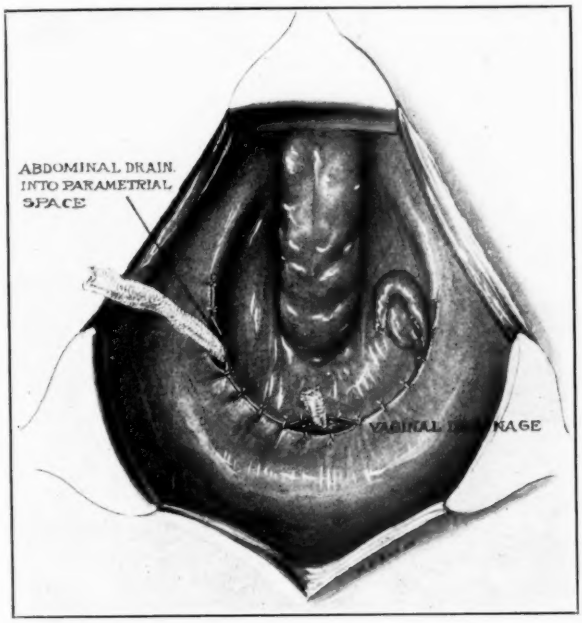

Fig. 4.—Operative procedure (continued) showing uterus, tube, and ovary removed, broad ligament and cervical stump closed over drains as indicated. (Left adnexa depicted, artist's error.)

had been converted into a cystic mass, size of small orange, found plastered on right posterior surface of uterus, tube apparently not involved. The left adnexa appeared moderately injected, ovary cystic, size of small orange. Upon separating the right ovarian cyst, free pus was liberated, thick, yellow, and nonodorous, from a perforation on the posterior median aspect of the uterus. A finger, passed into the opening, revealed an abscess cavity, involving the right wall of the uterus, and extending into the right parametrial space. A supracervical hysterectomy and bilateral salpingo-oophorectomy were performed. This procedure was decided upon, in preference to incision and drainage, because of the extent of involvement of the uterine wall and the general impression that the induration present in the base of the broad ligament, warranted a hysterectomy, in order to open up the tissues and afford better drainage. Upon dividing the right broad ligament, about one ounce of the same pus was evacuated.

The entire right parametrial space was found to contain suppurative products and inflammatory detritis. Owing to the dense exudate infiltrating the base of the right broad ligament, it was found impossible to remove the cervix. There was, likewise, a resulting distortion of the normal anatomic relations which rendered

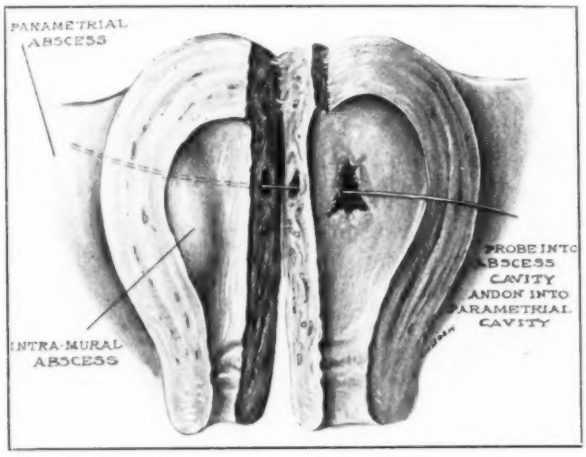

Fig. 5.—Anterior view of open uterus, indicating primary lesion and intramural abscess.

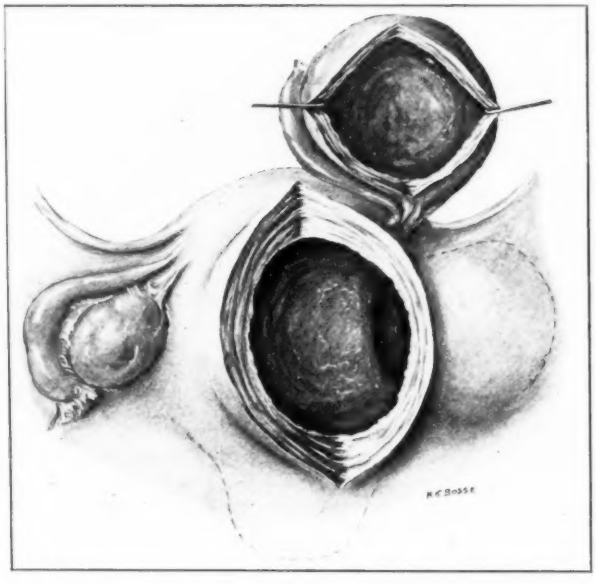

Fig. 6.—Posterior view of specimen, intramural abscess cavity opened, ovarian abscess cavity opened.

impossible the localization of the right ureter, and it was more or less a matter of trusting to luck to avoid injury to the latter. The bladder was extremely thickened and friable, as the consequence of an inflammatory brawny infiltration, making it very difficult to bring the same over the cervical stump in the usual manner.

The iodine gauze strip which had been previously introduced in the cervical canal, through the vagina, was allowed to remain in situ, as a through and through abdominovaginal drain. A second gauze strip was placed through the abdominal route, down to the right parametrial space, leaving the margins of the broad ligament open and separated at this point, for further adequate drainage. A rubber tissue drain was left in the lower angle of the wound.

The immediate postoperative reaction was fairly good, with the assistance of the necessary supportive measures of clyses, stimulating medication, etc. Thereafter, for a period of ten days, the temperature varied between 100° and 104°,

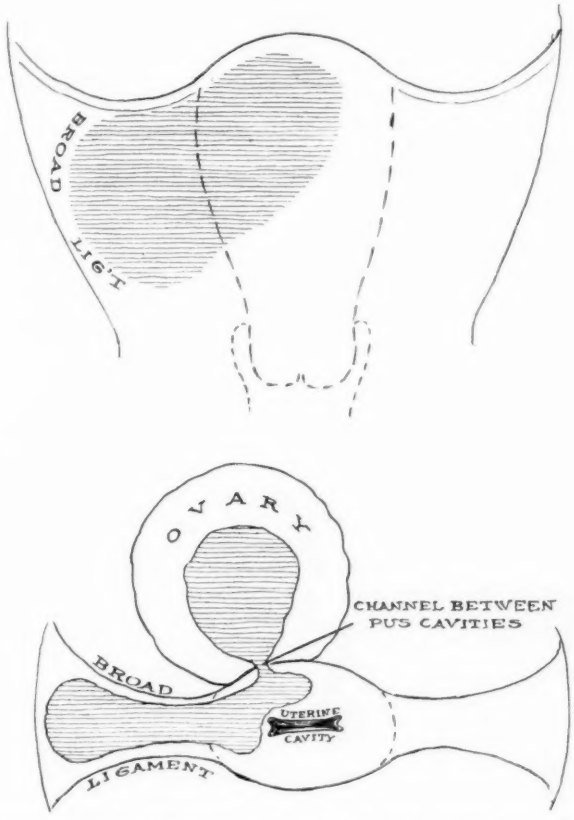

Fig. 7.—Diagrammatic sketch showing relations and extent of abscess cavity.

pulse 100-140. During this interval, the patient's general condition was fairly good, there was a moderate amount of pelvic and abdominal discomfort, accompanied by a rather profuse seropurulent discharge. All drains were removed on the eighth day. On the tenth day postoperative, there developed a discharge of urine from the lower angle of the abdominal wound, probably the result of a suture necrosis involving the bladder wall. This discharge persisted for four weeks, finally ceasing as a result of spontaneous closure of the fistulous opening. During this period there were no other complaints, the general condition continuing quite satisfactory. At the time of discharge, six weeks' postoperative, the wound had healed by secondary intention. Pelvic examination at this time revealed the cervical stump high, fixed, with a small amount of induration in the right fornix.

Pathologic report: The uterus is enlarged to the size of ten weeks' pregnancy, the muscle wall is about one inch thick, the uterine cavity is slightly distended, the uterine mucosa is moderately swollen, especially the posterior wall, which is of a dark red color. In the middle of the posterior wall, directly in the center, there is a lesion, about 1 cm. in horizontal diameter, and 1 cm. in vertical diameter. Introducing a probe reveals a wedge-shaped defect, with its base on the uterine mucosa and its apex towards the fundus uteri, probably due to trauma, incident to the curettage. This defect is partly filled up with fresh granulations of a light greyish red color. On section, the uterine wall shows thick and partly patent veins. One of these veins leads into the above described defect; a side branch of this vein is filled with a smeary greyish yellow mass. This latter vein can be followed to the right parametrium, through an abscess cavity which occupies the right lateral wall of the uterus and extends to the parametrial fossa. Both tubes are swollen and of dark red color. They are soft and moist; their lumen does not contain pus. Both ovaries are enlarged, size of tangerine orange; their peritoneal surfaces appear injected. There are multiple small cysts in both ovaries, the largest about the size of a pigeon's egg. The right ovary which has been adherent to and removed from the uteroparametrial abscess, contains a large cavity, filled with a dark red, smeary mass. The wall of this cavity is formed by edematous ovarian tissue, revealing diffuse hemorrhagic infiltration.

Microscopic.—Uterus; the wall of the abscess cavity is formed by very cellular granulation tissue, which consists mostly of plasma cells, lymphocytes, intermingled with polynuclear leucocytes. There are plently of newly formed capillaries and even larger vessels. The latter are seemingly in direct connection with the cavity, and are filled with polynuclear leucocytes. Scattered throughout the uterine muscle there are several foci of granulation tissue, all well vascularized, and containing many leucocytes (polynuclears).

Tube.—The mucosa shows no signs of inflammation.

In conclusion, I wish to emphasize the final paragraph of the admirable report of Sampson wherein he states, "Its occurrence (i.e., intramural abscess) as a distinct clinical entity has already been observed a sufficient number of times to warrant a more general recognition of it as such, and it deserves greater attention in obstetrical and gynecologic literature than has been accorded it in the past."

I desire at this time to express my appreciation to Drs. John O. Polak and Leo Schwartz for the privilege of operating upon this service case and reporting the same. I am likewise indebted to Dr. M. Goldzieher for his valuable pathologic interpretations.

875 St. Marks Avenue.

REFERENCES

(1) *Barrows, C. C.:* Am. Jour. Obst., 1911, lxiii, No. 4. (2) *von Franque:* Samml. klin. Vortr., N. S., No. 316. (3) *Noble, G. H.:* Trans. Am. Gynec. So., 1906, xxxi, 296-301. (4) *Mercade:* Ann. de Gynec. d'Obst., 1905, ii, 4. (5) *Sampson, J. A.:* Am. Jour. Obst., 1910, lxi, No. 3.

ENDOMETRIAL TISSUE IN THE ABDOMINAL SCAR FOLLOWING CESAREAN SECTION

By O. H. Schwarz, M.D., St. Louis, Mo.

ENDOMETRIAL tissue in the abdominal scar following pelvic operations must at the present time still be regarded as of rather infrequent occurrence. However, with the great interest at the present time in the subject of ectopic endometrial tissue, which has been

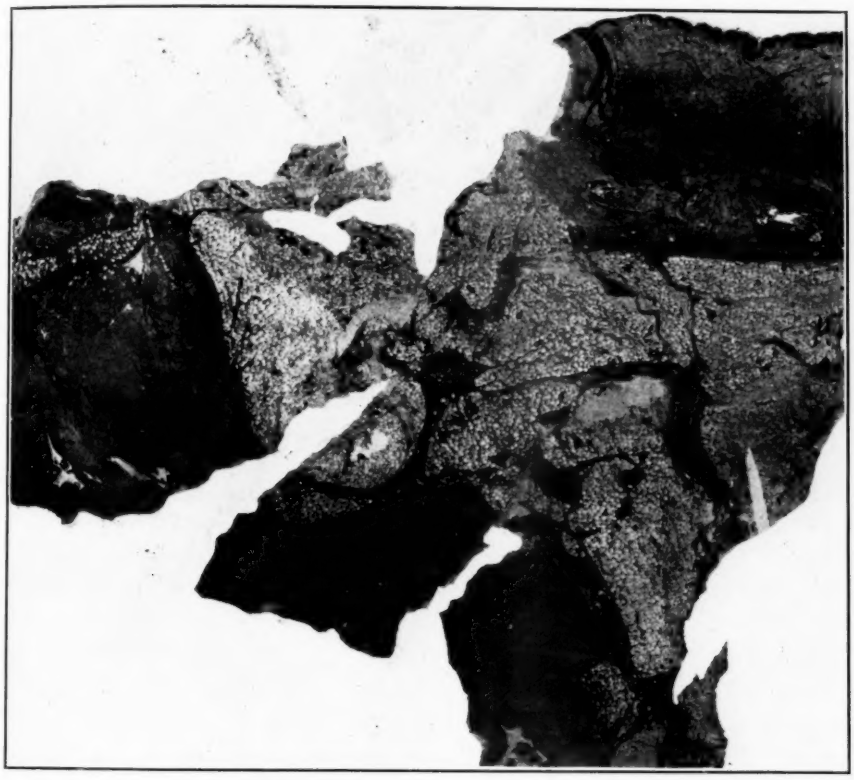

Fig. 1.—Section through entire extent of specimen, showing in upper right corner of section squamous epithelium of skin with sebaceous glands. Fibrous tissue very dense in area below epithelium. Intermediate layer is adipose tissue and dark lower area fibrous tissue. In this area, the endometrial glands are imbedded. A few striated muscle bundles are also found here.

stimulated chiefly by the epoch-making work of Sampson, this lesion may prove to be much greater in frequency than has been suspected previously. As in the case of other lesions containing endometrial tissue which were formerly regarded as infrequent but are now found rather commonly, in particular the lesion in the ovary, so ectopic

endometrial tissue in the abdominal scar may also prove to occur more frequently when interest is focused on this lesion. For this reason I am reporting an additional occurrence of this kind.

The subject of endometrial tissue in the abdominal scar was thoroughly discussed by Heaney in 1925. In reviewing the literature Heaney found that there were twenty-nine cases in which endometrial tissue had been found in scars following abdominal operation. Of these, seven cases were following operations on the pregnant uterus. He added two more cases of his own, and at the same time an additional case was reported by W. C. Danforth, bringing the total up to ten. Of these ten cases, seven followed cesarean section.

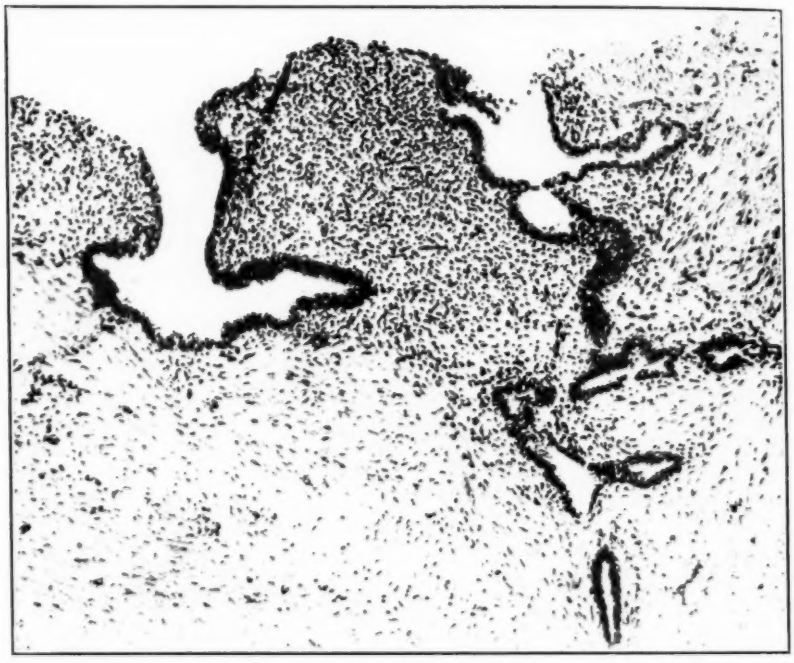

Fig. 2.—High-power showing character of endometrial tissue seen in lower portion of Fig. 1.

Our specimen, which consisted of a small irregular piece of tissue, was presented to me by Dr. George Ives of St. Louis, who had previously made the diagnosis. He obtained the piece of tissue from Dr. A. Trumper of Montgomery, Alabama. The following history was sent with the specimen: The patient, aged twenty-eight years, three years ago had a cesarean section, the indication being eclampsia. A living child was obtained. The abdominal wound healed by first intention and the convalescence was uneventful, the patient leaving the hospital fourteen days after operation. Two years after operation the patient complained of a sensitive spot at the upper end of the

abdominal scar. A nodule was found about one inch below the umbilicus. The growth was removed under a general anesthetic. It was the size of a cherry and not encapsulated; it was found attached to the fascia, was immovable and pale grey in color. After removal of the nodule the wound healed cleanly. On microscopic section the squamous epithelium of the skin was found above a dense layer of connective tissue, under which was a considerable layer of subcutaneous fat. Below this, in a deeper layer of fibrous tissue which also contained some striated muscle bundles, was found a considerable amount of endometrial tissue. There was also some infiltration with small round cells in this area. The glands also were surrounded with definite endometrial stroma. The character of the tissue can best be seen by consulting Fig. 1.

COMMENT

The source of the endometrial tissue in these cases is undoubtedly due to an implantation of endometrial tissue from the endometrium of the uterus during the operative procedure. I have observed on two occasions in studying the cesarean scar of the human uterus endometrial tissue along the line of incision. In an experimental study on the cesarean scar in the guinea pig, endometrial tissue was found in several cases along the line of incision, as well as on the peritoneal surface of the uterus. The readiness with which the endometrial tissue developed in these locations in the guinea pig was quite impressive. Additional clinical reports may prove that this can just as readily occur in the human.

If this condition proves to be at all frequent, it may be another point in favor of the low cervical incision in which locality the uterus is lined chiefly by the cervical mucosa, with the possible exception of the extreme upper limit of the incision.

REFERENCES

Danforth, W. C.: Am. Jour. of Obst. and Gynec., July, 1925, No. 1, x, 630-632.
Heaney, N. Sproat: Am. Jour. of Obst. and Gynec., July, 1925, No. 1, x, 625-629.
Schwarz, O. H., and Paddock, R.: Am. Jour. of Obst. and Gynec., August, 1925, No. 2, x.

A CONSIDERATION OF SOME OF THE ASPECTS OF STERILITY*

By G. L. Moench, M.D., New York City, N. Y.

IT IS only recently that even the medical profession has come to recognize that a childless marriage, with or without a history of gonorrhea, may be the fault of the man as well as of the woman. As a result the proper procedure now in the case of any sterile couple includes an examination of both husband and wife.

I will deal in this paper only with those cases of sterility in which the husband has at least a fair number of actively motile spermia and also possesses the necessary potentia coeundi. I will leave aside such evident causes of sterility as general constitutional defects or disorders and genital hypoplasia or other gross malformations in the female, as presenting no problems of diagnosis. For the same reason I will omit a detailed discussion of the relation of the endocrine disturbances to sterility. While it is true that we may not know how to treat such endocrine disturbances, it is also true that we can in practically every case recognize that an endocrine imbalance of some sort is present. As a result such dysfunctions offer more truly a problem of treatment than of diagnosis and it is the latter field of sterility that I wish especially to take up here.

In the female the two most important single factors of sterility probably are lesions of the cervix and occlusion of the fallopian tubes. The rôle of the cervix uteri in sterility is too well known to require more than a few words. The principal lesions here are congestion and inflammation which may cause sterility by entangling the spermia. This is a purely mechanical action. Even in the presence of pus I have failed to find any definite evidence of a chemical effect on the spermatozoa. As for the possibility of a narrow cervical canal preventing the ascent of the spermia, as was formerly thought, it can today be stated positively that any cervix sufficiently patent to allow the menstrual blood to escape will also allow a spermatozoon, whose greatest lateral diameter is 2 to 3 microns, to pass. I might say here too that I do not consider a retroversion of the uterus *per se* as a cause of sterility. Retroversion in itself does not cause congestion of the uterus or pelvic organs. The vessels in the uterine ligaments are never angulated acutely enough by a simple retroversion to cause obstruction of the venous return, as can be seen by anyone who pro-

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duces an artificial retroversion either at operation or on the cadaver. Congestion, if present, with retroversion of the uterus is due to concomitant causes. That a retroversion will cause sterility because the cervix is pointed forward and lies against the anterior vaginal wall is also to be doubted. Anyone who has done a number of compatibility tests and seen how the semen is deposited over the whole top of the vagina and cervix will attribute little importance to the location of the cervix. Furthermore, the occurrence of pregnancy even in extreme retroversion is adequate clinical proof that such a position of the uterus need not cause sterility.

The closure of the fallopian tubes, up to a few years ago, presented one of the problems of sterility whose solution could only be guessed at. Thanks to the carbon dioxide insufflation of the tubes we now have a ready answer to this question.

Besides these just mentioned, more or less easily determinable, causes of sterility, an investigation of the patient's life and habits, sexual or otherwise, may at times offer a clue as to the underlying cause of the infertility. Again menstrual disturbances and vaginal discharge may help to guide us. The influence of diet on fertility must also be thought of. This problem is still under investigation. Reynolds and Macomber[1] have shown in rats that vitamine deficiency may cause sterility. Whether or not the results of these investigations can be applied to humans remains however to be seen. At the same time it appears to me that, with the varied diet of most persons today, a dietetic sterility will not be common.

Still another cause of sterility may undoubtedly lie in abnormalities of the genital tract which prevent nidation: endometritis, tuberculous or otherwise; hyperplastic or polypoid endometria, and similar lesions may influence fertility but should be easily determinable.

If all the factors mentioned disclose no cause for the sterility, what then? Simply to tell a childless couple that there is nothing abnormal to be found will not alleviate their troubles. The real problem of sterility today, I believe, lies in determining the hidden causes of the infertility in just this group of patients. I will take up, therefore, the various possibilities which are generally offered to explain otherwise undetermined cases of sterility. They fall under one of the four following headings:

1. Selective fertility.
2. Incompatibility of the sexual partners due to
   - a. Vaginal acidity
   - b. Sperma immunity
   - c. Psychic causes
3. Abnormalities of the female germ cells.
4. Abnormalities of the male germ cells.

1. SELECTIVE FERTILITY; ALSO CALLED RELATIVE INFERTILITY OR RELATIVE STERILITY

Since sterility and fertility are practically always relative and rarely absolute, I have coined the term selective fertility as being, I believe, more descriptive of those cases where a man may impregnate one fertile woman and fail to do so with another. In many instances such selective fertility can be shown to be due to the fact that the male has relatively few and perhaps not very strong spermia and will achieve impregnation only if conditions in the female genital tract are exactly suitable. A mild cervicitis for example might explain such selective fertility. Again, the more highly developed libido of one of the women leading to more frequent intercourse might reduce the number of spermia and so cause at least temporary sterility. I am, of course, aware that a good many other causes have been advanced as explanation of selective fertility, but it seems to me that the best one can say for them is that they are all theoretic, many of them improbable and some illogical. The supposition for instance that fertility is influenced by the blood grouping of the sexual partners appears especially far fetched. Nature would hardly set about to deliberately limit procreation to certain chance combinations. At any rate selective fertility is uncommon and can rarely be shown to be the sought for cause of sterility.

2. INCOMPATIBILITY OF THE SEXUAL PARTNERS

A good deal has been written about the compatibility of the sexual partners. Leaving aside the cervix lesions previously mentioned, and selective fertility discussed just now by itself, we can I believe limit ourselves to the three subheadings given, namely: vaginal acidity; sperma immunity, and psychic causes. I will take these up in the order mentioned.

(a) *Vaginal Acidity.*—I will say right here at the start that I do not believe that vaginal acidity has anything to do with sterility. Vaginal acidity is due to lactic acid. It is the normal finding and the highest values of vaginal acidity are always found in the most normal vaginae. Any vaginal disease reduces acidity. Furthermore, vaginal acidity, except during pregnancy, practically never exceeds 0.5 per cent lactic acid and I have determined by repeated trials that spermia live for hours in 0.5 per cent lactic acid solution.* In addition, in considering any possible effects of the vaginal acidity on the spermia it must be remembered that the titrated value of the vaginal acidity will always be reduced by the semen itself and that the volume of the alkaline

*After I had finished these experiments I discovered that Graefenberg (Arch. f. Gynäk., cviii, Nos. 2 and 3) had made similar investigations. He found that a 1 per cent lactic acid solution killed off most of the spermia in three hours whereas a 0.5 per cent solution left them practically unaffected.

semen far exceeds that of the normal acid vaginal secretion, (and if the latter is not normal it will be less acid). Again, the semen is normally deposited in the least acid portion of the vagina near the cervix. At the same time I admit that a long continued stay of the spermia in the acid vagina will kill them off. Here, however, the question arises how long do normal spermia remain in the vagina. An actively motile spermatozoon, according to Henle[2] will travel 2 cm. in seven minutes. Personal observations agree very well with this statement inasmuch as I have found that actively motile spermia travel between 1 and 2 cm. in eight minutes. With such rapidity of locomotion vaginal acidity is not going to affect the normal and strong spermia but only the weakened or entangled forms. W. W. Williams, D.V.M., of Springfield, Mass., an authority on animal sterility, recently wrote me that in cows he had used antiseptic uterine douches two to three hours after service without preventing conception. This shows again the rapidity with which the spermia travel. I am convinced, therefore, that the compatibility test devised by Hühner,[3]—much as it has been lauded,—is misleading and has done more harm than good because it has prevented inquiry in the right direction. A cervicitis or other lesion which might entangle the spermia can be recognized without a compatibility test and, besides even if spermia should be found enmeshed in the cervical mucus, how are we to judge whether the stronger spermia have not already passed the barrier. If, as is usually the case, the compatibility test is done one hour after intercourse, the real possible impregnators of the ovum will be far beyond our reach, and, whether those left in the vagina are dead or alive depends in most instances on purely temporary local conditions. If the compatibility test, on the other hand, is done very early after intercourse inimical secretions cannot yet have affected the spermia. Dr. Williams, with his experience with animals, corroborates my views in this matter. He told me that he does not depend very much on the motility alone of the spermia obtained from the vagina of the cow, because in many cases he found it hard to obtain motile spermia even with bulls of proved high fertility. Nevertheless, since long-continued acidity is detrimental to spermia, it might be thought that the sodium bicarbonate douches often recommended might be valuable. This, however, can hardly be so since Weil[4] has shown that the beneficial effects on the spermia are only exerted within narrow limits of alkalinity and that a change of the hydrogen-ion concentration in either direction therefrom acts detrimentally. Furthermore, the attempt to save spermia too weak to survive normal conditions may of itself be of rather doubtful value.

(b) *Sperma Immunity.*—Metchnikoff,[5] Landsteiner,[6] McCartney,[7] Mayer,[8] Vogt[9] and many others basing their conclusions on the results of experiments mainly in animals believe that spermia intoxication may

be responsible for some cases of unexplained human sterility. To me this seems little likely. A sperma immunity could only occur where very frequent intercourse takes place. This, however, is very seldom the case with the childless woman who consults us, since in most instances she has been married several years, so that sexual relations have become more or less regulated and are no longer unusually frequent. With my patients at any rate too frequent sexual congress was not present, nor did microscopic tests ever point to sperma immunity as a cause of the infertility. In no case did the blood serum of the wife affect the spermia of the husband any differently than neutral human blood serum in which I have found the spermia to continue actively motile for hours. It is interesting also to note here that Oslund,[10] judging from his experiments, does not believe very much in a specific spermatoxin activity but thinks that many of the results obtained with animal experiments along these lines are explainable by an indirect general reaction of the whole body.

(c) *Psychic Causes of Sterility.*—The tremendous influence of the psyche on the body and its functions is well known.[11] At the same time there are many objections to explaining undetermined cases of sterility as the result of psychic influences. Psychic factors can easily cause disturbance of menstruation, evoke vaginal discharge, and many other gynecologic symptoms but will hardly act directly on either ovum or spermatozoon. I believe the cases of pregnancy following rape and of conception occurring in women to whom sexual intercourse is always abhorrent bears this out.

Admitting nevertheless that selective fertility, incompatibility of the man and woman, or psychic reactions may explain a few cases of sterility, a large percentage of infertile unions must remain undetermined. For this latter group I believe we have to seek an explanation in the possible abnormalities of either the male or female germ cells. I have felt for some time that such abnormalities of the germ cells represent the most important cause of otherwise undetermined sterility. For this reason I have devoted my efforts to the attempt of finding such germ cell changes, more particularly in the case of the male where a direct examination of the germ elements is possible.

3. ABNORMALITIES OF THE FEMALE GERM CELLS

Unfortunately we cannot examine the female germ cells directly. At the same time the presence of a normal menstrual history, normal ovaries by palpation and a normal relation between the histologic picture of the endometrium and the menstrual periods will indicate undisturbed ovarian activity and presumably healthy ova. I have also found in agreement with other observers that a normal (bacillary)

flora in a vagina undisturbed for at least four to five days points in the same direction.

4. ABNORMALITIES OF THE MALE GERM CELLS

In the male we are favored by being able to examine the germ cells directly and this is especially important since, unlike the female, the male has no reliable external indicators of a normal gonadal reaction as far as spermatogenesis is concerned. Too often, however, the semen examination consists only in looking through a microscope, seeing numerous motile spermia and concluding that the husband is normal. There is much more to an examination of the semen than that. I will not delay here to discuss the meaning of prostatic crystals or the presence of pus fibrin, blood or epithelial cells in the specimen, nor will I more than mention the possibility of the condom containing a disinfectant which may affect the spermia. Assuming that the microscope—with a No. 2 ocular and a high dry lens shows 25 to 50 or more actively and progressively motile sperm, the next step is to determine how long the spermia remain motile. Some men advise the use of a warm stage for the microscope for this purpose but I cannot agree with them; normal spermatozoa should remain alive for hours even at room temperature; if they do not, it shows that they cannot be fully normal. In such cases then it is not likely that the particular spermia are virile enough to overcome the obstacles necessary to reach the ovum.

In addition to determining the motility of the spermia, a number of authors advise looking for abnormalities of the germ cells and then go on to say that abnormal spermia are not important anyway as long as a sufficient number of motile, normal-appearing cells are present. Furthermore, none of the authors offer any detailed description of what the various abnormal spermia may look like nor could I find any record in the literature that anyone had studied human spermia carefully enough to be able to recognize any but the grossly pathologic forms. Indeed the determination of the minor but nevertheless important abnormalities of the spermatozoa is not always easy but promises to be of great value. In animals, especially bulls, Drs. Williams and Savage[12] have carried on extensive examinations of the spermia and have arrived at very interesting results. Since my own work with human spermia was based on these animal investigations it is necessary, in order to evaluate my own results, to state here briefly the conclusions arrived at by these two men. Drs. Williams and Savage found that the morphology of the sperm head constitutes the greatest single source of information as to the fitness of these cells for reproduction; and, since in average cases the relative numbers of abnormal cells afforded an index to the reproductive fitness of the individual, they recorded alterations of the sperm heads on a proportionate basis. They thus found, for instance, that no bull which had more than 166

abnormal sperm heads per thousand had a good breeding record. In addition to the abnormal sperm heads differences in the size of these structures were also noted. Now it is true that the size of the sperm heads varies somewhat in different animals of the same species; at the same time, within reasonable limits, the sperm heads of one ejaculate should all be of uniform size in normal animals. Drs. Williams and Savage therefore measured and plotted 300 head lengths of each semen specimen. Following this, the functions of the obtained curves were determined by the usual methods employed in biometric studies.[13]

Naturally, examinations of the kind described are only possible with properly prepared and stained smears so that when I first started these examinations I had to determine the best methods of staining the spermia. I found Williams'[14] method by far the best and modified it along the lines needed to suit the smaller human sperm. The stain I use now consists of a filtered mixture of two-thirds Ziehl-Neelsen's carbol-fuchsin and one-third concentrated alcoholic eosin (bluish) solution. To the finished mixture one-third 95 per cent alcohol is added. As a counterstain I use Loeffler's methylene blue to which two parts of distilled water have been added. In this way the heads of the spermia take varying shades of blue, whereas the bodies and tails are red.

The method used in examining these smears was briefly as follows: a thin even smear was made on a clean slide. This was air-dried, fixed with heat, and then treated ten to twenty minutes with a 1 per cent chlorazene solution to remove the mucus. The slide was then carefully washed in water and 95 per cent alcohol, it was then stained four and a half minutes, washed off quickly and counterstained four to five seconds. The stained smears were then examined with a magnification of about eleven hundred diameters and the various abnormal forms counted and tabulated. Usually 1000 sperm heads were counted.

The most surprising thing to me was the close similarity between the abnormal human spermia and those of the bull. Of course, these abnormalities were modified by the difference of size and shape of the two types of spermia but the underlying structural differences were identical. At the same time I found that the percentage of abnormal forms ran much higher in the case of a fertile man than Williams and Savage had noticed in the case of the bull. I have, however, had too little experience at present to know whether this is the normal variation of the species homo or whether civilization has actually reduced fertility in man. Fig. 1 gives some idea of a number of the sperm abnormalities observed. It will be the aim of future work to determine the relative importance of these various abnormalities. At this time I can only say that it seems as if those sperm changes which affect the nucleus are more important than, for instance, cytoplasmic extrusions.

After the described preliminary examination the sperm heads were projected onto a screen at a magnification of three thousand diameters and the apparent size in millimeters of three hundred of them measured. The edges of the field were avoided in this work because of the possibility of distortion.

I started my investigations with the semen of a number of known fertile men and Fig. 2 shows the graphs of two of them constructed from the measurements of their sperm heads. While these curves again agree very well with the graphs of normal bulls, the bases of the curves are a little broader than those of highly fertile bulls. I

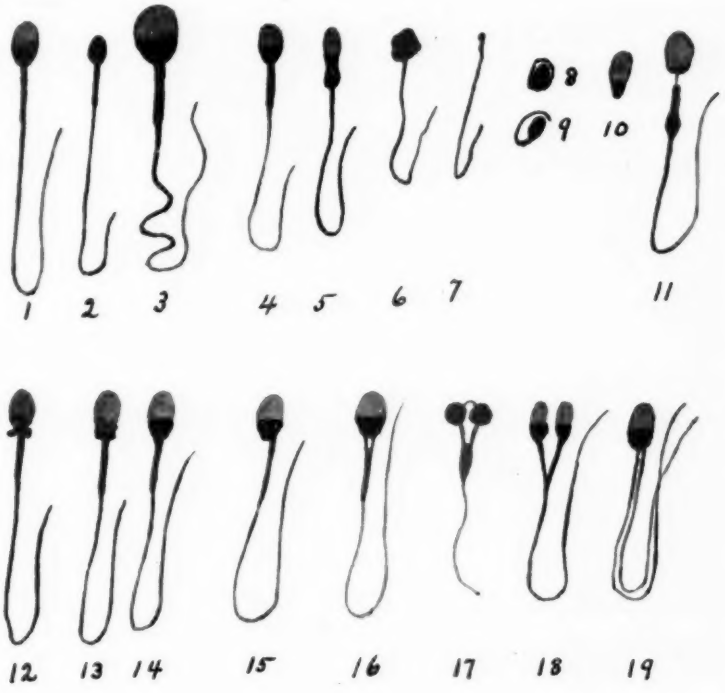

Fig. 1.

am, however, at this time not prepared to offer any interpretation of this fact and it will take hundreds of cases to definitely lay down the limits of normal variation. I have not entered the biometric calculations on the curves because they can only be valuable after a large number of specimens have been measured, whereas at present, because of the time-consuming nature of the work, I have been able to investigate only a small group of cases.

One case (Clinic No. 7743) is interesting enough to report here in connection with the two graphs shown. This woman had negative physical findings and told us that a test had showed her tubes to be open. I therefore carefully investigated the husband's semen and

found the best specimen I have yet seen. There were less than 10 per cent abnormal forms and the cells were nearly all of the same size. We therefore reexamined the wife and repeated carbon dioxide insufflations showed the fallopian tubes closed at a pressure even as high as 240 mm. of mercury.

After a number of fertile men had been examined I picked out cases of sterility in which we could find no explanation for the infertility in the wife. Fig. 3 shows the graphs constructed from the sperm head lengths of two of these. Case C shows a somewhat better curve than D, but in each case the variations in size of the sperm heads are very

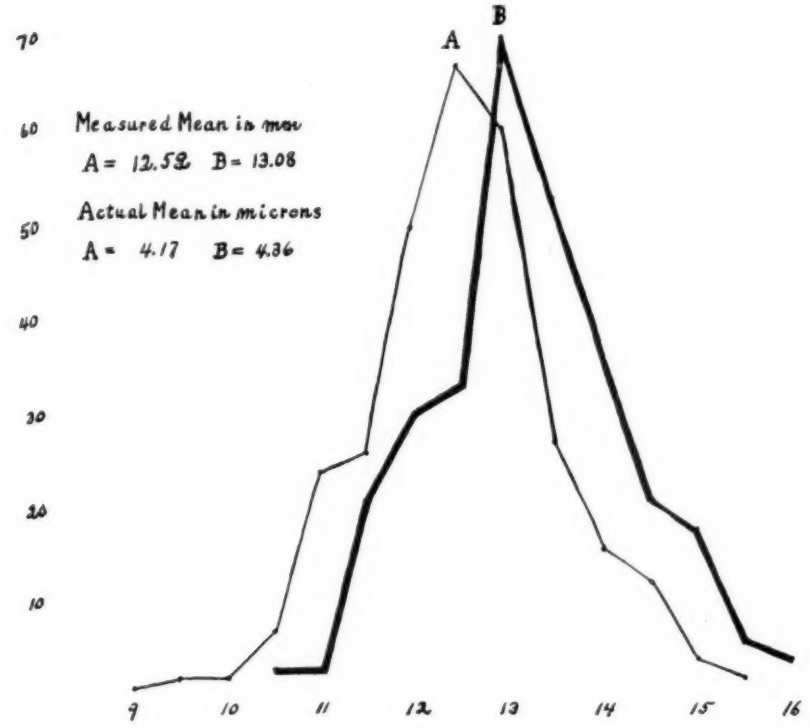

Fig. 2.

marked. Case D is an extremely poor curve. These curves again agree very well with what Williams and Savage have found in bulls with a very bad breeding record.

An interesting graph is shown in Fig. 4. Before examining the husband's semen I believed the woman to be the responsible agent in this childless union since both a mild cervicitis and a slightly lacerated cervix were present and the reading of the carbon dioxide insufflation test of the tubes was rather high. In view of the curve obtained I now think, however, that perhaps the husband is more at fault than the wife. Curve E certainly agrees remarkably well with those graphs

obtained in bulls of questionable fertility and in the cows served by such bulls abortions are frequent.

Of course all the findings I present here constitute only a preliminary report. In themselves they would be rather valueless were

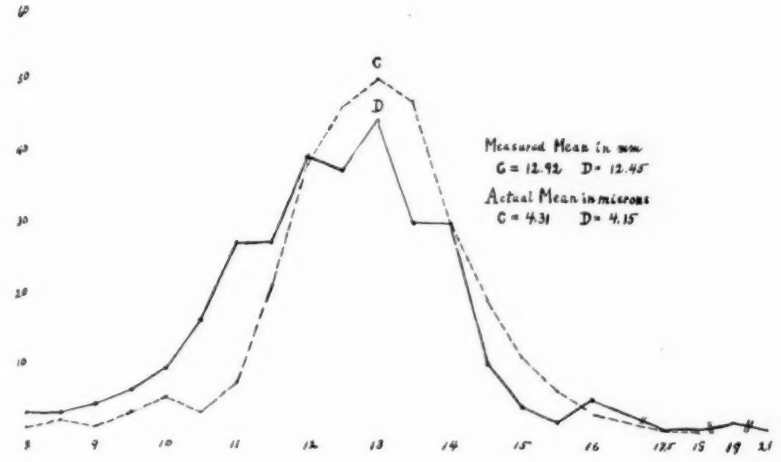

Fig. 3.

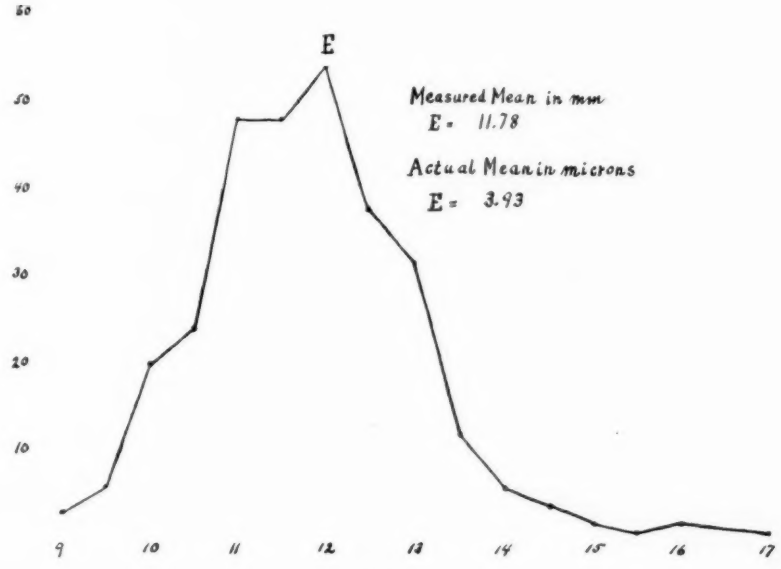

Fig. 4.

it not for the fact that they agree so well with the results of the same investigations in animals. In view of this fact it seems to me that there is a bright prospect of solving at least some of the hitherto unexplained cases of human infertility. One question which has long

puzzled me has, to my mind, been answered by these examinations of the sperm heads. I had often wondered why some men with relatively few spermia were normally fertile, whereas other men with many more spermia were relatively infertile. I believe now that the abnormality of the sperm heads will explain this apparently paradoxical situation.

Due to the general institution of monogamy in civilized countries it will be very much harder to establish the limits of normal variation in man than in animals. We probably shall see that men with relatively abnormal spermia and fairly wide variations in the size of these cells, will still be fertile to a certain extent, due to the fact that intercourse is repeated continually with the same woman.

Aside from the relation of sperm head abnormalities to sterility itself a further large field that must be investigated is the relation of the spermial changes to habitual abortion, hydatid mole and abnormalities of the products of conception in general. In the case of animals it has been proved that pregnancy from bulls with bad fertility graphs often end in abortions. May it not be then that where we have been in the habit of seeking the hidden cause of the abortion in the woman and treated her in all the various ways known to us, the real culprit was the man? May it not be likewise that the abortions occurring in recently married couples are due not to the too frequent sexual intercourse itself but to the increase in sperm head abnormalities resulting therefrom? Perhaps, after all, the habitual abortions have only been an attempt of Nature to avoid abnormal offspring and though much has been written on the treatment of habitual abortion it does not seriously seem to have occurred to anyone to ask the question: "Is it even worth while to try to save these products of gestation?" It seems to me that before we institute any form of treatment in obscure cases of habitual abortion a thorough search for the underlying causes of such interruptions of pregnancy should be made not only in the wife, but also in the husband. Let us be sure first that the fault does not lie with the husband before we indiscriminately treat the wife.

It is evident of course that abnormal spermatogenesis if present can only be the result of some underlying disturbance and it will be our duty to determine why such abnormal spermatogenesis is present and what can be done for the patients so afflicted.

REFERENCES

(1) *Reynolds and Macomber:* Fertility and Sterility, Saunders, Philadelphia, 1924; Jour. Am. Med. Assn., No. 3, p. 169. (2) *Henle, cited by Posner:* Arch. f. Frauenk. u. Eugenik Würzb., vii, 209. (3) *Hühner:* Sterility in Male and Female, Rebman Co., New York, 1913. (4) *Weil:* Arch. f. Frauenk. u. Eugenik Würzb., vii, 238. (5) *Metchinkoff:* Ann. de l'Inst. Pasteur, xiv, 369. (6) *Landsteiner:* Centralbl. f. Bacteriol., xxv, 346. (7) *McCartney:* Am. Jour. of Physiol., lxiii, 207. (8) *Mayer:* Klin. Wchnschr., i, 1142. (9) *Vogt:* Klin. Wchnschr., i, 1144. (10)

Oslund: Jour. Am. Med. Assn., Spanish Edition, xv, No. 12. (11) *Schwarz, Oswald:* Psychogenese und Psychotherapie Koerperlicher Symptome Springer, Wien, 1925. (12) *Williams, W. W. and Savage, A.:* Cornell Vet., October, 1925. (13) *Babcock and Clausen:* Genetics in Relation to Agriculture, New York, and London, 1918. (14) *Williams, W. W.:* Jour. Am. Vet. Med. Assn., 1920, lviii, No. 29.

30 East Fifty-Eighth Street. (*For discussion, see page* 394.)

SEPARATION OF THE SYMPHYSIS PUBIS, WITH A REPORT OF SIX CASES*

By Samuel W. Boorstein, M.D., F.A.C.S., New York City

SEPARATION of the symphysis pubis or rupture of the pubic joint is not very common in obstetric practice. It occurs, however, with sufficient frequency to warrant a short résumé of the subject together with suggestions for treatment.

It may be of historic interest to recall that up to the time of Andreas Vesalius in 1543, the belief was general that the birth of the child could not be effected until the pelvic cavity had become increased in size by the separation and gaping of the pelvic bones.

Symphyseotomy, which was practiced so much in this country up to a few years ago, is defined by Williams[1] as the division of the pubic joint in order to bring about an increase in the capacity of a contracted pelvis sufficient to permit the passage of a living child. Thus we see that separation can and has been intentionally produced at the delivery but as the after effects were deleterious and the treatment complicated, the method has been abandoned. Kehrer in 1915 collected from the literature 100 cases of rupture of symphysis pubis. Hence this type of injury is not very rare. When rupture of the pubic joint does occur the obstetrician should be prepared to take care of it. I shall discuss only the postobstetric separation of the symphysis and not the traumatic or the one produced intentionally (symphyseotomy).

According to DeLee[2] predisposing causes are softening and relaxation of the capsule, caries, rachitis, osteomalacia, trauma during pregnancy, congenital weakness of the ligaments, have all been found in such cases when even the distention of the pelvis during spontaneous labor may cause the joint to give way. Contracted pelves, especially the justominor and funnel varieties, predispose, because the expansile force acts in the narrow transverse diameter. A large child or especially broad shoulder may act in the same way. The direct causes include improperly directed forceps traction, as by pulling upward too soon or by pulling upward with the patient on a low bed, in both cases the head acting as a wedge between the rami, or using too great force, will produce the rupture, perhaps even in the absence of patho-

*Read before the Bronx Obstetric and Gynecological Society, May 31, 1926.

logic softening. These facts are important from a medicolegal point of view, but as a rule, the physician may not be held responsible, unless it can be shown he employed undue force in delivery.

Effects on Labor.—The effects of separation of symphysis is exactly the same as those of symphyseotomy, viz., the capacity of the pelvic canal becomes considerably increased, particularly in its transverse and oblique, and less so in its anteroposterior diameters. In a gap of 3 to 6 cm. Williams calculates the increase would aggregate 12 or 13 mm. Farabeuf points out that there is a still greater enlargement of the superior strait from an obstetric point of view for one of the parietal bosses fits into the opening between the gaping pubic bones, thereby considerably increasing the space available for the passage of the head. Döderlein has calculated that when the pubic bones gape 6 to 7 cm. the area of the superior strait is increased by one-half.

The symptoms of symphyseal rupture are as follows: Where the predisposing causes are very evident the patient may have complained of pains in the pubis and sacroiliac joints, with difficulty of locomotion for several weeks. During spontaneous labor the rupture may be discovered at the moment it occurs. During the operative delivery, the obstetrician usually notes that the obstruction of the progress of the child has suddenly disappeared. He may feel the joint open. Later the patient complains of intense pain over the pubic joint radiating down the thighs. She cannot move the legs, which lie everted and abducted. Overstretching of the joints without actual rupture sometimes occurs in difficult forceps cases, and makes the woman bedridden for months. There is local pain and mobility between the joints. There may be ecchymosis. There may be gross and palpable separation. In one of my cases there was a separation of 3.5 cm. In many cases separation of sacroiliac joints is also present though it should not occur simultaneously because the separation of the symphysis allows room enough for the child.

A few cases (not obstetric) are on record in which such lesions have been associated with a direct shifting upward of one side of the pelvis, as a whole—an actual double luxation—a lesion obviously to be diagnosed by palpation; a lesion, by the way, proved not so dangerous as it appears.

Injury to the bladder, arthritis of the pubic joint are the usual complications. In symphyseotomy, of course, infection plays an important rôle.

The diagnosis depends on history of a difficult labor, on local pain, tenderness of pubis, mobility, and separation of pubis. The pain is brought out by direct pressure, by alternate pull and push on the thighs, and particularly by forced abduction. Whether the point of separation is between cartilage or between cartilage and bone is hard

to determine even by x-ray. There are no other lesions with which it can be confused.

The orthopedic surgeon does not consider a separation of symphysis per se as a serious injury provided of course that there are no marked complications. He considers that union can be satisfactory and function will be good. Complete recovery is usually obtained in three to four months. DeLee[2] no doubt voices the opinion of the obstetrician when he says that even when recognized early, this accident is very dangerous.

The difference of opinion is perhaps due to the fact that it is the duty of the obstetrician to avoid such an accident and if it should occur, to view the matter as a serious injury. The orthopedic surgeon, whose experience makes him familiar with serious injuries in the pelvic region, considers it only a traumatic injury and treats it accordingly. While for the obstetrician the duration of treatments of three to four months seems tremendous, to the orthopedic surgeon such a period is very common.

TREATMENT

It is best to place patient on a Bradford frame as soon as possible to facilitate nursing care. A pillow is placed under the knees to relieve the drag of the extremities upon the pelvis, the knees being loosely bound together for the first week.

A broad strip of adhesive plaster may be applied to the pelvis, the ends being brought around in front and doubled back on themselves to provide a firm support for the insertion of a lacing of bandage or other material which is used to tie them together tightly in front of the pubis. A piece of felt can be placed over the pubic hair to protect against adherence to the adhesive. Later on a webbing belt should be used, encircling the body just above the level of the trochanters and drawn firmly together in front by appropriate straps and buckles. Perineal straps are necessary to retain the belt in position. (Goldthwait's support.)

"In the event of wide gaping of the symphysis (or of similar displacement in a fracture of the rami of the pubes) a broad canvas sling or hammock should be passed under the pelvis and low back, and the ends secured to the overhead beams of a Balkan frame. The pressure of the sling on the sides of the pelvis, from the weight of the patient's body, exerts a strong compressing force on the bones, which tends to push them together. With this apparatus the Bradford frame is unnecessary, and the nursing care is facilitated by suspending the ends of the hammock by means of weights and pulleys so that the patient may be lifted readily when this is necessary. The general comfort is promoted and the deformity more easily corrected if, at the same time, the legs are suspended in Cabot's posterior wire splints and counterpoised appropriately with weights and pulleys, in order

to relieve the pelvis of the strain which their weight imposes." (Wilson.[3])

The corrective apparatus as extension, hammock suspension, etc., should be continued for a period of two to four weeks. Then they may be removed and greater freedom of the legs permitted. Recumbency should be maintained for four to six weeks. The pelvic belt is then ordered and patient permitted to walk, at first with the aid of crutches. Some surgeons permit free motion in bed to facilitate early fibrous union but the patient is usually uncomfortable.

A word about the delivery of the child. I do not intend to dictate to the obstetricians, I shall merely quote DeLee[2] on this step after the symphyseotomy. "Some operators leave the delivery to nature or wait for later indication, especially in primiparae, but by the majority immediate delivery is practiced. In primiparae I prefer to leave the delivery to nature, as does Stoekel also. The fetal heart is to be auscultated almost continuously and delivery done at the earliest sign of fetal danger.

"Version is generally not advised. The head may be pressed into the inlet from above, or a few pains awaited and then the forceps applied. During the delivery the assistants press the pelvis together from the sides, but I believe Kerr's suggestion to use the Walcher position is better. It is highly important that the mechanism of labor be favorable—a posterior occiput or a brow presentation, therefore, should be corrected previous to extraction. It is my practice to remove the placenta very soon and pack the uterovaginal tract with gauze as a routine."

Williams,[1] on the contrary, says: "After symphyseotomy, the child should be delivered by forceps or version, according to circumstances."

REPORT OF CASES

Case 1. E. M., primipara, age 25. Referred by Dr. H. J. Epstein from his obstetric service at Bronx Hospital on April 16, 1924. Patient had a very difficult labor necessitating high forceps. Sustained a separation of the symphysis pubis, about 3.5 cm. gap; also a separation of the sacroiliac joints. (Fig. 1.) Had a great deal of pain in the front of pubis on motion and also on urination. Was seen by me at the Bronx Hospital a few days later. Physical examination showed a marked gap at the region of symphysis. Pain on any attempt of motion. Adhesive plaster was applied and a sacral compressor of Goldthwait type ordered. In a few days the belt was applied and patient felt much more comfortable. A few days later baking and massage was instituted. It took some time (about four to five months) before she was able to walk. Limped for a while but then made a good recovery.

Case 2. R. B., age 32, primipara. Referred by Dr. S. Spitzer on Feb. 9, 1926. On December 1, 1925 patient was delivered by forceps, with difficulty. After the delivery, patient complained of pain in the region of the symphysis, also in the back radiating to the right hip. Diagnosis of separation of symphysis was made

Fig. 1.—Case 1. Note the marked gaping between the two pubes. (8.4 cm.) Note also the separation of the sacroiliac joints (X). (Retouched.)

Fig. 2.—Case 2. Separation of the symphysis (4.5 cm.) and sacroiliac joints (X). (Retouched.)

and patient was admitted to Fordham where the radiograms showed separation of symphysis about 4.5 cm. She was treated by strappings and improved. A few weeks later she still had pain, could not walk without a limp, and one could still detect the separation of symphysis. With the special belt the patient gradually improved. (Fig. 2.)

CASE 3. (Case of Dr. G. L. Broadhead) T. F., fourth pregnancy. Seen by me in eighth month of pregnancy. The other pregnancies were normal; no forceps

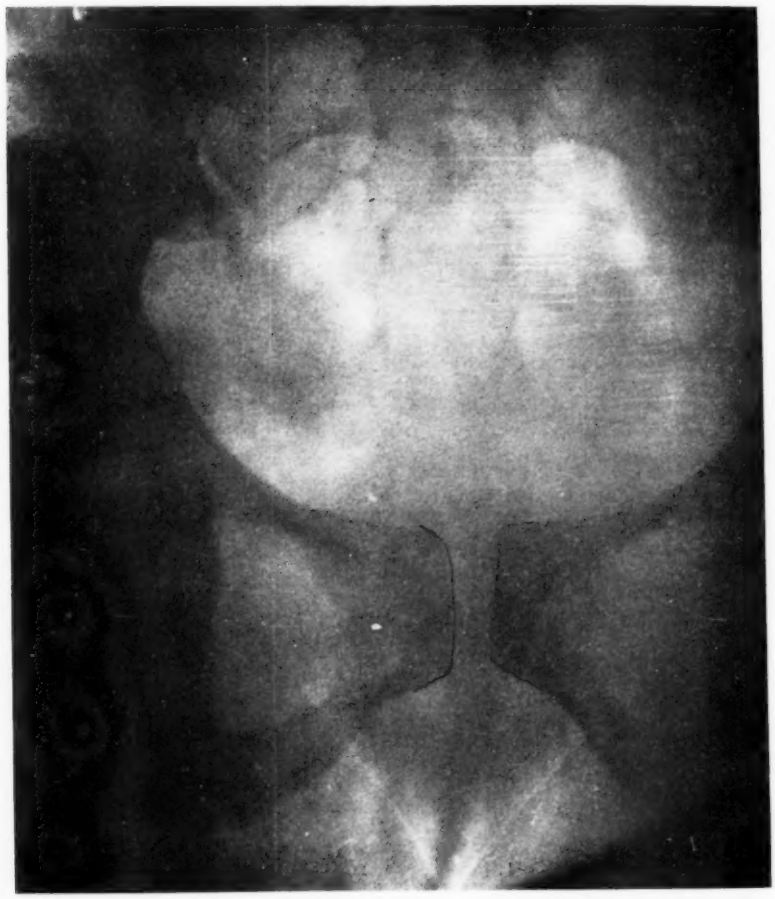

Fig. 3.—Case 4. Separation of symphysis (1.2 cm.) and sacroiliac joints (X). (Retouched.)

used. About one week previous to my examination she began to complain of pain in region of symphysis pubis and on turning in bed. Could not walk. No pain while at rest. No pain on urination. Patient looked in good health. Tenderness and separation of pubis felt. On abduction of the left limb had a great deal of pain. Applied adhesive plaster but after a day or two had to remove it. Patient kept in bed, but was not seen again. Dr. Broadhead reported that the delivery was normal. No extra or additional pain was felt. She had pain for about two days and the symphysis became normal.

The following three patients were on the obstetric service of Dr. J. H. Telfair

at Fordham Hospital. He was kind enough to give me the histories and the radiograms for use in this report.

CASE 4. A. H., primipara, age 26 years. Delivered on Dec. 19, 1921 with difficult labor necessitating high forceps. Had separation of symphysis for 1.2 cm. The forceps were not exceptionally hard ones to apply and while child was being delivered, those present could hear the sudden crack at the symphysis joint. No sacroiliac relaxation. Made a complete recovery. (Fig. 3.)

CASE 5. C. L., age 26 years, para iv. Spontaneous delivery on June 12, 1922. Separation of symphysis to extent of one-half cm. Recovered.

CASE 6. J. N., age 24 years, primipara. Separation of 6.5 cm. Admitted on June 12, 1922. Forceps. Good recovery.

CONCLUSIONS

1. Separation or rupture of pubic joints occurs in obstetric practice and should be guarded against.

2. While there may be predisposing causes, such as softening and relaxation of the capsule, rachitis, or justominor contracted pelvis, the real cause is improperly directed forceps.

3. Symptoms are pain in the pubic and sacroiliac joints, difficulty in walking, and a palpable gap in the pubic joint.

4. Immediate placing the patient on a Bradford frame with adhesive plaster strappings, makes the patient comfortable. Later on a belt can be made.

5. Prognosis is not as bad as the obstetricians would want us to believe. Proper orthopedic treatments relieve the symptoms and help to an early recovery.

Acknowledgement.—I desire to acknowledge my great appreciation to Drs. J. H. Telfair, H. J. Epstein, and G. L. Broadhead for their kindness in assigning these patients to me and for their assistance in studying them.

REFERENCES

(1) *Williams, J. W.:* Obstetrics, ed. 4, 1922. D. Appleton and Co. (2) *DeLee, Joseph B.:* The Principles and Practices of Obstetrics, 1924, W. B. Saunders Co. (3) *Wilson, Philip D., and Cochrane, Wm. A.:* Fractures and Dislocations, 1925, J. B. Lippincott Co.

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THE "ANATOMIA INFANTIS" OF GABRIEL DE ZERBI

By Le Roy Crummer, M.D., Omaha, Nebraska

THE first work on anatomy printed in the sixteenth century was entitled, Gabriel de Zerbi; *Opus Anatomiae totius corporis humani et singulorum membrorum*, Venice, 1502. In this particular period, all of the anatomic writings were based either on Galen or Mundinius, and the various editors usually were content to reproduce the text of either one of these two authors, with many comments and but slight additional information drawn from personal observation of the external of the human body or from very superficial dissections.

Woodcut illustrations had been introduced in a few books on anatomy in the last decade of the fifteenth century, and so much attention has since been paid to the graphic anatomic incunabula; i.e., Ketam, Hundt, the *Concilliator* of Petrus de Abano, and the *Maragarita Philosophica* of Reiysch, that the books on anatomy without illustration have been almost forgotten. Among the authors who published such early works on anatomy may be mentioned Vassé, Leoniceno, Benedicti, Benivieni, Valla, Achilini, and de Zerbi.

The controversies and priority claims of these various authors, many of whom taught anatomy in the Italian universities, have long been settled and are of no particular interest today, but just as Copho's *Anatomy of the Pig* persisted after Mundinius, so Mundinius held sway long after Vesalius, and the ideas of these early anatomists persisted for a long period beyond the time of the brilliant discoveries in anatomy. There are many reasons for the persistance of this belief in pre-Vesalian anatomy, not the least of which was the popularization of these earlier ideas of anatomy by the publication of numerous popular health books, which, originally issued even before 1500, have been copied, issued, and reissued up to the present day. The *Masterwork of Aristotle* and the *Secrets of Albert the Great*, each a peculiar mixture of charms and superstition, with early sixteenth century anatomy and obstetrics, are still printed in enormous editions and may be found in almost any secondhand bookshop.

But to return to de Zerbi: Gabriel de Zerbi (1458-1505) was professor of anatomy at both Padua and Rome. He had a most unfortunate life, being forced to flee from his position in Rome on account of theft and soon afterwards was murdered by a slave of the Pasha. His chief work, *Opus Anatomiae*, etc., 1502, was, according to Sprengl, entirely in the method of Mundinius, but, nevertheless, it was based on more or less dissection. He gave a very early, if not the

first description of the round ligaments of the uterus, and properly ascribed the olfactory protuberance to cerebral substance. He also disputed Galen's idea of two umbilical veins, asserting that there was only one.

There is no record of subsequent editions of his *Opus*, and Haller states that the only further appearance of his work is found in an excerpt entitled *Anatomia Infantis* which was printed in the 1537 edition of Dryander's *Anatomiae Corporis Humani*.

Dryander (d. 1560) was professor at Marburg and the author of one of the most important illustrated pre-Vesalian anatomies. The first edition of his book, almost unknown, was in 1536. It had only twenty folios, but it was based on two dissections which he made in the spring of the same year. An enlarged edition with thirty-five folios, with the title *Anatomiae Corporis Humani*, Marburg, 1537, contained added illustrations and increased text and there was also included the first separate printing of the *Anatomia Porci* of Copho, and the excerpt from de Zerbi's *Opus* with the title, *Anatomia Infantis*.

In 1541, Egenolph, the Frankfurt publisher, seems to have formed a close association with Dryander. He published the latter's *Anatomia Mundini*, and in 1542, his *Der ganzen Artzenei Spiegel Gemeiner Inhalt* which went through many subsequent editions. This association, it would seem, continued until Dryander's death, for as late as 1557, Egenolph issued a new edition of the *Artzenei Spiegel*. This friendship with Egenolph should outweigh Dryander's quarrel with Vesalius and the subsequent ill repute. Egenolph probably caught the popular fancy more completely than any other publisher of the period, and his medical publications, profusely illustrated, were issued under the editorship of Dryander and Ryff, both of whom have been damned by the mispraise of Vesalius. Egenolph's chief editor and best friend was Phillip Melanchton, and it is difficult to condemn entirely men who were associated so closely for years with Egenolph and Melanchton. In his position as editor, Dryander had opportunity to choose the best from the earlier authors, and therefore his selection of de Zerbi's *Anatomia Infantis* stamps it as representing the best knowledge of the period.

In spite of the many difficulties of Renaissance Latin, the following translation fairly represents the ideas of the original.

Anatomy of the Infant, Taken from the Commentaries of the Distinguished Anatomist, Gabriel de Zerbis

If the fetus is to be male and by abortion comes out within forty days, the womb being open, coming out from the orifice, together with moisture on to the earth, it will be dissolved because of its tenderness, and will not be found because of its smallness. If, however, the abortion takes place over cold water which is smooth and

clear, a creature will be found by straining, and it will have the appearance of a large ant. And this substance will be found in a kind of a web or membrane, and its head and all its limbs are formed and distinct. And sometimes, when it has recently been emitted, it will be found to have motion of dilation and constriction when it is pricked with a needle, on account of which it is clearly known that this creature is animate; and it is found that its generative organs and eyes are large in respect to its size, for this reason, because as yet, they are not complete and united, but in the fluid matter there comes out the appearance and form of members: and a similar thing happens in the case of other animals, as to the eyes and generative organs, before their full growth; for these members always have great size compared with the rest.

But if what has been conceived is to be female, and through abortion has come out from the womb before three months, that is ninety days, the thing that has come immaturely will be found to have no form; but if it has entered the fourth month, or completed the third, then there will be found a female form; moreover, when it is complete, it is quickly filled out to the final form in which it is born, since a compact thing that is moist, will, after it begins to remain fixed, be formed and completed more quickly than one that is dry.

While the little infant is in the womb, it holds its hands at its chin, Hippocrates said, and its head at its feet; neither is it possible to judge of the truth, nor will you see in wombs, whether the child keeps its head higher or lower; for the fetus, before its motion outward, in the case of natural birth, said Avicenna, undoubtedly is upright, that is, it is in a state of rest and stands or is in position above the feet; and its face is upright and is bent above its knees, and the palms of the hands are supported on its knees and its nose is placed between both knees; and the eyes are above both knees and it certainly draws both knees to an anterior position; and the neck, with the back, is toward the anterior part of its mother; and its face lies inclined toward its mother's back, defending, no doubt, by the hardness of the mother's spine, the heart of the fetus from external injuries.

The reasons for its position is: because then this position is more convenient for making a turn, that is to say, at the time of birth, above the head, since its egress is thus a better egress; then also because it occupies a smaller place, although there are those who say that this position is only that of the male; Avicenna, namely, said its disposition is such, that is of the male; of the female the disposition is the reverse; yet this dictum is lacking in reason, but its position in the uterus is different from the position of the fetus of most others in the class of brutes. For every quadruped animal is placed stretched out in the womb on account of the length of the womb. But the animal that lacks feet lies along its side, as can be seen in the dolphin and whale and other fish that generate their like in the uterus. The biped animal, however, rests curved-in from the womb just as birds in the egg and man in the womb; that is, they rest in the womb curved inward; because in this way the nose of the human being is between its knees and its eyes above its knees and the ears outside its knees when the human being is in the uterus. And this position is certainly for the purpose of some protection of the heart, Avicenna said in the case of animals; and this method is more suitable for protecting itself, that is to say, from injuries that might come to it from without.

The fetus is attached to the womb, with the secundines as a connective, with the veins joined to its liver, but with the arteries that are in the secundines connected with the heart; the covering of all of these is the umbilicus until they unite at the fetus of the mother. It also has some connection with the father and the parts of his body through the formative virtue derived from the father's generative power which is in the seed and creative spirit.

This, then, is the authoritative professional understanding of embryology at the beginning of the sixteenth century.

We scarcely realize today how quickly during the Renaissance, the "latest" theories were disseminated in the popular health books written in the vernacular for the benefit of the common people. Such a sequence or contrast may be shown by comparing de Zerbi's opinions with a chapter on the same subject taken from a popular health compilation of an unknown author of almost the same date: *Ain gut artznei*, etc. Froschauer, Augsburg, ca. 1505. (Sudhoff No. 120.)

This little tract printed in German is an early type of the pseudo-scientific health books, and Chapter "E" may be translated as follows:

"How a child is at first in the mother's belly/ In the first month, it is a blood clot; In the next month, it has the beginning of a belly/ In the third month, it has a belly/ In the fourth month, it receives a navel/ In the fifth month, it has something similar either to the father or to the mother/ so that one can see if it is a boy or a girl/ In the sixth month, it has vessels all over its belly just like a man should have/ In the seventh month, it has bones in its limbs/ In the eighth month, these become stronger and stiffer/ And in IX month, nature separates it and promptly throws a well made child from darkness to the light of day."

I wish to acknowledge my indebtedness to Dr. J. A. Rice, Jr., Professor of Classic Languages, University of Nebraska, for his aid in the translation of de Zerbi.

City National Bank Building.

THE TIME OF OVULATION AND THE PROGNOSIS OF ARTIFICIAL INSEMINATION*

PROF. DR. OTTO GROSSER

(Anatomisches Institut der Deutschen Universität in Prag)

IT IS striking that the principal event in the cyclic genital functions of the human female, the time of ovulation, still remains a matter for discussion. Four different methods have been used to determine the time of ovulation. Fraenkel, of Breslau, was the first to observe the aspect of the ovary during laparotomies performed for various reasons, and he found that, on the average, on the nineteenth day after the onset of the last menstruation there was found a large corpus luteum, of intense red color, bleeding easily. Neglecting the time necessary for its development, he concluded that ovulation must occur on the eighteenth or nineteenth day after the onset of menstruation. A similar way with similar results was followed by two Frenchmen, Ancel and Villemin, who declared the sixteenth day was the usual day of ovulation. The special merit of Fraenkel's studies was, first, that he had found a way of accumulating data from a great number of actual observations, and secondly, that he reckoned from the beginning of menstruation, instead from its end, the latter date being far more uncertain and variable than the first. Deeper knowledge of menstruation itself, which really began only with Hitschmann's work in 1908, explains this fact; the onset of menstruation suddenly interrupts the uterine changes that prepare for gestation, but restitution of the destroyed mucosa does not always require the same number of days, being continued gradually and without exact limitation into the resting state of the mucosa of the interval.

Opposition to Fraenkel's views came from Robert Meyer, of Berlin, and his pupils. They worked on anatomic material secured at gynecologic operations, and found that ovulation occurs in the first half or in the middle of the menstrual cycle. Meyer considers an average of the ninth day (after onset of menstruation) to be the rule for a healthy young woman, while Schroeder claims it to be the fourteenth to the sixteenth day. Corner's observations on apes come nearest to this.

Both methods are objectionable in that they are not based on perfectly healthy women; Fraenkel's patients were laparotomized for a variety of pathologic conditions, some of which could have deranged the

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cycle, especially in postponing the ripening of the follicle and the beginning of the menstrual flow, and Meyer's and Schroeder's patients were suffering from genital diseases, particularly from carcinoma in initial stages. It is true that carcinomata might disturb the cycle less markedly than extragenital illness. Hence the earlier date as given by Meyer-Schroeder apparently offers the greater probability of correctness.

A third method, first used by the anatomist Triepel of Breslau, consists in an attempt to determine the beginning of development by considering the young embryos of known age, as recorded in the literature. My own investigations of material of this sort demonstrated that there is no rule to be found; development may begin at any time of the cycle, the average calculated from the cases hitherto reported indicating broadly that first development begins in the majority of cases about in the middle of the cycle.

But there is still a fourth way to determine the date of ovulation, and this consists in finding the time of natural optimal fertility or the average conception day. All statistics, relating conception to the menstrual cycle, show a very marked optimum at about the eighth day (after onset of menstruation). But there is no day when fertilization could not occur, perhaps with sole exception of the first day of menstruation.

Before considering a way to harmonize these conflicting data, a word should be said about the vitality of the sex cells. It is generally admitted and in fact cannot be denied, that the sperm cells might survive and remain motile in the female genitalia for several days and even some weeks; but it is probable that on the average this time is rather short, from one to two days. In rodents it is even below one day, and in man the same is probably true for young people with frequent sexual intercourse, where sperm would be accumulated if it were not destroyed, and where that curious and not fully understood process of immunization of the woman against sperm may occur, perhaps as a result of quick dissolution and resorption of sperm. Such immunity may be the cause of sterility, although both partners are in evident health, and may be eliminated again by temporary separation of the couple for some time, say several weeks or perhaps better several months.

In any case, we have not the slightest proof for the supposition that the survival of spermatozoa is the rule, and it is quite unjustifiable for one author to combine the optimum of fertilization (eighth day) with the time declared by Fraenkel or Schroeder as the ovulation date (nineteenth or fifteenth day), by supposing a regular or physiologic waiting-time for the sperm cells. The latter certainly are not more apt to fertilize after a stay of some days in the fallopian tube; they must be less apt to do so, if indeed (as has not yet been

determined) they can do so at all. Motility is not identical with normal fertilizing power.

Other factors enter into the consideration of the female sexual cell, the ovulum. Before being fit for fertilization, the ovulum must undergo two cell divisions, called the maturation-divisions, which result in the formation of the polar bodies that are expelled from the cell. Maturation occurs in all cases of sexual reproduction, not only in vertebrates or in animals generally, but even in plants. In mammals, maturation seems always intimately connected with the rupture of the follicle, but at the end of the process the nucleus of the ripe ovulum is not reconstructed. It is awaiting fertilization in quite a labile state, and if fecundation does not occur within a relatively short time (comprising only hours and probably always less than twenty-four hours), the ovulum degenerates and is lost. This has been demonstrated histologically and more recently, by American authors, experimentally as well. Besides, such an ovulum is always promptly seized by the mechanism provided for its transport (movement of the cilia and peristalsis of the tube) and carried down the genital tract, being expelled if not fertilized; there is no place where the ovulum could await the spermatozoa. Consequently, the moment of ovulation must practically be identical with the moment of insemination or of the beginning of development, and if this moment is missed, fertilization cannot occur. We may therefore say, that though spermatozoa may possibly await the ovulum, the ovulum can never wait for the spermatozoa.

In its bearing on the question of artificial insemination, this knowledge is of primary importance; if the ovulum survives ovulation only for a few hours, artificial fecundation cannot be expected to succeed if not done just at this time.

A fixed date of ovulation is a postulate of physiology. Comparative physiology shows that ovulation is connected with heat (estrum), and therefore formerly it was generally believed that ovulation should coincide with menstruation or perhaps precede it for only one to three days. The work especially of Robert Meyer showed that the cyclic development of the follicle and its transformation into the corpus luteum determines the transformation of the endometrium and that there is no menstruation without a corpus luteum on the way toward regression. Hence the regularity of menstruation depends on regular changes in the follicle.

It is difficult to reconcile with this view the differences in the time of ovulation, as determined by the various methods of investigation, and it is still more difficult to explain the apparent and considerable variability in this time, as demonstrated by every one of these methods. The optimum time for impregnation, the eighth day, seems to me to be of greatest importance in this connection, because fertilization is

certainly the primary object of these genital processes, and we may regard the conception optimum as indicating the moment of greatest vitality of the germ cells. The various anatomic and autoptic investigations, however, point to a later ovulation time. Fertilization also may occur at a later time. With an invariable ovulation time this fact could not be explained—except by the assumption that the menstrual cycle was delayed in such cases, in other words, that without fecundation, the menstruation would have appeared later, but these cases are too frequent to permit such a supposition. A plausible explanation may still be offered by assuming that there are two ways of ovulation. In mammals ovulation may occur either spontaneously or incident to copulation; in the majority of instances it is spontaneous, but in the rabbit and the cat and perhaps some other rodents and carnivora (the ground-squirrel and the ferret) there is no ovulation at heat without mating, and it is actually provoked by the latter. The development of the corpus luteum in these animals depends upon copulation. Without it the follicles show regressive changes after heat, and so afford to new follicles the possibility of ripening and producing heat anew.

For the human female, Robert Meyer has shown that the changes in the epithelium of the follicle, leading finally to the formation of the corpus luteum, have already begun before rupture of the follicle, and are, to a certain though not yet sufficiently determined degree, independent of rupture; therefore ultimately the ovulum itself determines the whole sexual cycle and the date of rupture of the follicle has not the same importance for the cycle as it would have if the development of the corpus luteum could begin only with the moment of rupture.

In the human female, ovulation has previously been generally considered as spontaneous, and there is no doubt that as a rule ovulation occurs between two menstruations, independent of sexual intercourse. But in addition to this, some gynecologists and anatomists admit that ovulation may be induced by copulation, calling it then violent or provoked ovulation. Incontestable proofs of this view are wanting. Proofs could only be statistical, in view of the dubious character of the whole matter, and single laparotomy or autopsy records should be of little value; but even such are not known.

Nevertheless, we feel justified to combine this idea with the results of investigations on the date of ovulation. Spontaneous ovulation may occur at the middle of the cycle, when differentiation of the fibrous wall of the follicle has sufficiently progressed. Such a follicle, however, has already been for some time in a labile state, and with sexual intercourse the rupture might then take place already at approximately the eighth day, that is, about a week before the regular time for spontaneous rupture. Under both conditions the develop-

ment of the epithelium of the follicle proceeds nearly in the same manner, so that for the sexual cycle the date of actual rupture would be almost or entirely without importance.

Another possible explanation would be that ovulation might be postponed by a mental influence, especially by fear; a similar effect has been demonstrated for spermatogenesis in people condemned to death, and perhaps all these later dates for ovulation, as ascertained in anatomic material or in operated women, might be in part due to this factor.

In any case, while we concede that development of the follicle and rupture, to a certain degree, are independent from each other, we must again emphasize the strict dependence of the life of the ovulum upon such rupture. The latter provokes the maturation of the ovulum, as already stated.

In this manner, however, only a part of the difficulties of the problem are eliminated. How shall we explain the fact that impregnation is also possible long after spontaneous ovulation at the normal time? One way would be to admit the rupture of a second follicle; but this is very improbable, as observation shows that twin follicles or corpora lutea are rare and, if they are present, they always exhibit the same stage of development. Another possibility would be that in such a case the spontaneous rupture had been delayed and then actually took place under some external influence, especially that of the fertilizing copulation. In such cases the ovulum ought to have survived longer than is generally the case in follicles not having come to rupture. Why sometimes the closed follicle could exert such a protective influence on the ovulum, and how long the survival of the latter may last, is uncertain; but if, then, the ovulum is set free and, after maturation and impregnation, starts on its way down to the uterus, it may frequently find there a mucosa already too far progressed in its normal development for menstruation, and the fixation of the ovulum may not be possible or, if occurring, it may be followed by early abortion. This possibility has been demonstrated by a number of very young human ova, among them especially by the celebrated case of Teacher and Bryce, where ovulation seems to have occurred only on the twenty-third day of the cycle.

We have already referred to the importance of these deductions in regard to artificial insemination. For the success of the operation it is necessary to be carried out as near as possible to the moment of ovulation. If we admit a spontaneous ovulation at about the fourteenth to the sixteenth day, and an ovulation provoked by copulation at about the eighth day, we must treat differently those cases where a sexual act can take place between the partners, from those where insemination must be tried without coitus having occurred. In the former case the (repeated) operative insemination should begin with the seventh or eighth day, in the latter with the fourteenth day. But success is always uncertain, and repeated experiments will be required. One fact may already be stated at the present time, namely, that a

success on (or after) the nineteenth day is quite improbable, although this time was specifically recommended by Miller who based his advice on Fraenkel's deductions.

There is scarcely any need to emphasize that medical help by artificial procreation should only be attempted in instances of traumatic impotence; even in nervous cases, the offspring will not be desirable for society, and in cases of congenital malformations of the genital organs the danger of transmission of the malformation should keep us from interference.

REFERENCES

References are given in extenso in the author's chapter on human development in "Halban and Seitz, Biologie und Pathologie des Weibes," 1925, vi; in the papers of the author in Anatomischer Anzeiger, 1915, xlvii, and 1918, and in Arch. f. Gynäk., 1920, cx, and Verhandl. Anatom. Gesellsch. Halle a. S., 1924. See also *Gieve, H.*, Ztschr. f. mikr. anat., Forschung., 1926, vi, and *R. L. Dickinson*, Am. Jour. Obst., and Gynec., 1926, xi, 51.

ABDOMINAL CESAREAN SECTION IN DETROIT IN 1926*

By W. E. Welz, M.D., F.A.C.S., Detroit, Mich.

RUDOLPH HOLMES[1] has said that "many a cesarean section has been done for indications which have been exceedingly specious, indications which are far fetched. These cesareans never will be reported for there was no real justification for their performance. Many of these operations are exemplifications either of the lack of judgment in placing indications, or of ignorance of true obstetric facts. Many a time, as rumors are bandied about of a cesarean section being done for strange reasons, we could not question the surgical ability of the operator, but we must concede his lack of obstetric equipment. It is not right for the surgeon, gynecologist or others to lay down the indications for a grave obstetric procedure when he, perhaps, never had had an obstetric experience, or his limited experience may have been obtained many years before. It is a pernicious system and looks not for the best interests of the patient. At least he should defer to the judgment of the obstetrician, to the man who has an abiding interest and contact with the specialty. And yet it is not alone the man whose training fits him for other fields of medicine who is forgetting the obstetric principles, but too often the obstetricians themselves have boldly seized upon cesarean sections as a ready and quick means of getting through with a case. How easy it is to spend some thirty minutes in performing a cesarean, and how hard it is to perform a Hicks version, or perhaps introduce the bag, and then to

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[1]Surg. Gyn. and Obs., 1915, xxi, 641.

await the time for the work to be completed, sitting up half the night perhaps. How loath the gynecologist is to give up to his assistant even a minor thing like a simple perineorrhaphy, and yet too often the complicated obstetric case is left to the tyro of the clinic because it is 'coming off' in the small hours of night."

J. Whitridge Williams[2] has also said that, "generally speaking, I consider the operation is being abused in two ways: first, that it is frequently employed unnecessarily; and secondly, that, even when strictly indicated, it is not always performed at the time of election, with the result that its mortality becomes needlessly high. The prime factor in bringing about this abuse is defective medical training, with consequent ignorance of the wonderful adaptability of nature, and of the resources of obstetric art."

The ease of performance has increased the incidence of abdominal cesarean sections very greatly in this country. While there are no definite statistics to show the exact rate of increase, those in practice during the past quarter of the century realize that this operation has increased from a rare surgical procedure to an everyday occurrence. In twenty-two years in Detroit this operation has increased at a rate over seven times as rapidly as the increase of population. Dr. W. H. Davis, Chief Statistician, Vital Statistics of the Bureau of Census, U. S., gives the following increase of deaths from cesarean section in the registration area of the United States:

1921	247	deaths
1922	266	"
1923	285	"
1924	304	"

There are vague and incorrect opinions as to the frequency and safety of abdominal cesarean section, not only among the laity but among the medical profession. Hardly a physician knows the number or results of sections in the hospital in which he works. In order to show the frequency and results of abdominal cesarean sections in Detroit, a survey was made of all sections performed in the city during the year 1925. Because of the incompleteness of records in many of the smaller hospitals, it was difficult to get even meager details of the work done in them. As far as possible this information was obtained from the operator directly.

During the year 1925 there were 32,130 living births and 1350 stillbirths in the City of Detroit, a total of 33,480 births recorded, of which 10,425 occurred in hospitals, an incidence of over 31 per cent. Approximately 30 per cent of white babies and 58 per cent of colored babies were born in hospitals in this city. Five hospitals: Grace,

[2]Surg. Gyn. and Obs., 1917, xxv, 194.

TABLE I. RATE OF ABDOMINAL CESAREAN SECTION IN FIVE LARGE HOSPITALS OF DETROIT IN 1925

HOSPITALS	CASES	SECTIONS	INCIDENCE
Grace	1000	31	1 to 31.2
Harper	1197	39	1 to 30.7
Kiefer	1428	10	1 to 142.8
Providence	2065	10	1 to 206.5
Woman's	1230	10	1 to 123.
Total	6920	100	1 to 69.2
City at large	33,480	154	1 to 217.

Harper, Herman Kiefer, Providence, and Woman's, each had 1000 or more births during the year. In these five hospitals 100 abdominal sections were performed in 6920 deliveries. In the fourteen hospitals in which there were less than 1000 deliveries during the year there

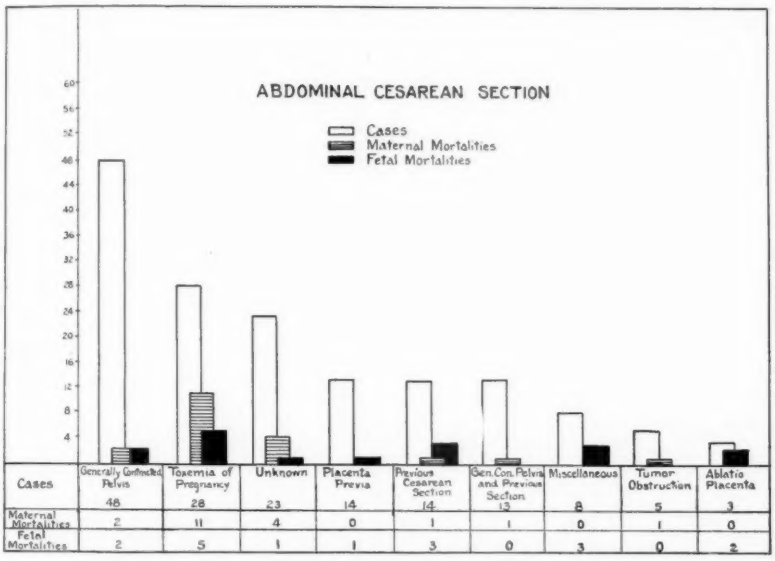

Fig. 1.—Showing incidence and mortality from cesarean section.

were 54 abdominal sections performed, or one section for every 65 deliveries. In the entire nineteen hospitals there were 154 abdominal cesarean sections in 10,425 deliveries, or one in 67.7 deliveries. In the entire city there were 154 abdominal sections in 3480 deliveries, which is one in 217. If the 11 vaginal hysterotomies are included, there were 165 sections, or one in every 203 deliveries.

A surprising variation in the percentage of sections done in various hospitals was found. In the five hospitals with over 1000 births, the rate of abdominal sections to all deliveries was as follows: Grace, 1 to 31.2; Harper, 1 to 30.7; Herman Kiefer, 1 to 142.8; Providence, 1 to 206.5; Woman's, 1 to 123. It is to be noted that one of this group had an incidence of sections almost seven times as great as another.

In the remaining 14 hospitals, each of which had less than 500 deliveries, the rate of abdominal cesarean sections was as follows: Booth, 1 to 135; Crittenden, 1 to 471; Deaconess, 1 to 73.1; Dunbar, 1 to 20; Delray, 1 to 50; East Side, 1 to 62; Ford, 1 to 97; Grace Annex, 1 to 63; Jefferson Clinic, 1 to 1; Marr, 1 to 106; Mercy, 0 to 6; Lincoln, 0 to 189; St. Joseph's, 1 to 34; and St. Mary's, 1 to 24.5.

TABLE II. RATE OF ABDOMINAL CESAREAN SECTIONS IN FOURTEEN SMALL HOSPITALS OF DETROIT IN 1925

HOSPITAL	CASES	SECTIONS	INCIDENCE
Booth	270	2	1 to 135.
Crittenden	471	1	1 to 471.
Deaconess	439	6	1 to 73.1
Dunbar	40	2	1 to 20.
Delray	150	3	1 to 50.
East Side	250	4	1 to 62.5
Ford	388	4	1 to 97.
Grace Annex	314	5	1 to 63.
Jeff. Clinic	1	1	1 to 1.
Lincoln	189	0	
Marr	318	3	1 to 106.
Mercy	6	0	
St. Joseph's	375	11	1 to 34.
St. Mary's	294	12	1 to 24.5
Total	3,305	54	1 to 65.
All hospitals total	10,225	154	1 to 66.4
City at large	33,480	154	1 to 217.

Eighty-eight (57 per cent) abdominal sections were done by obstetricians. Sixty-six (43 per cent) were done by surgeons. Included as surgeons were a number of general practitioners who do some surgery.

There were 20 maternal deaths (13 per cent) and 17 infantile deaths (11 per cent) in the 154 abdominal cesarean sections. Infantile deaths include stillbirths and neonatal deaths.

In 11 vaginal hysterotomies, two women died (18 per cent). In this group seven infantile deaths occurred (63 per cent).

For obvious reasons it is impossible to compare the death rates of surgeon, obstetrician and general practitioner.

Because of the incompleteness of records in many of the nineteen hospitals included in this survey, it was impossible to get much information of value on this subject. The only facts which were certain were the incidence of abdominal section and the maternal and infantile death rates following these.

Even such important facts as indications were often missing or not verified. So, in one hospital where six sections were done for pelvic contraction, no pelvic measurement or other proof of such contraction was shown.

In the cases of placenta previa there was merely the statement of the operator that this condition existed, without any description.

Most of the records for eclampsia and toxemia were inadequate. Among the unusual indications given without support of any evidence that section was essential were obstructed labor, immobility of pelvis, absolute inertia of the uterus, tuberculosis of the hip, transverse presentation, and insufficiency of uterine musculature.

Of the total 154 abdominal sections, forty-eight were performed because of contracted pelves and thirteen because of previous sections in contracted pelves. (This was 40 per cent of all sections.) In these sixty-one cases there were three maternal deaths (5 per cent) and two infantile deaths (3.4 per cent).

TABLE III. HIGH ABDOMINAL SECTIONS, DETROIT, 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Contracted pelvis	45	2	2
Toxemias	23	10	4
Unknown	23	4	1
Placenta previa	14	0	1
Previous section, contracted pelvis	13	1	0
Previous section	13	1	3
Miscellaneous	6	0	2
Tumors	3	1	0
Ablatio placentae	3	0	2
Total	143	19	15

There were twenty-six abdominal sections for toxemias of late pregnancy and eclampsia, an incidence of 17 per cent in a total of 154. There were eleven maternal deaths (42.7 per cent) in this group and five (19 per cent) infantile deaths.

In the group in which there was no indication stated and in which there was no evidence on the records to show why a section was performed, there were twenty-three cases (15 per cent). Four mothers died in this group (17.5 per cent) and one infant (4 per cent).

There were fourteen women sectioned for placenta previa (9 per cent of all sections). There were no maternal deaths and one fetal death (7 per cent) in this group.

There were fourteen sections (9 per cent of all) because of one or more previous sections in women in whom there were no pelvic contractions. In this group were one maternal death (7 per cent) and three infantile deaths (21 per cent).

The group classed as miscellaneous included abdominal sections performed for various maternal pathologic conditions, and comprised eight cases (5 per cent). There were no maternal deaths, but three (36 per cent) infantile deaths resulted.

There were five sections because of obstructing tumors (3 per cent of all). This group had no fetal deaths and one maternal death (20 per cent). There were three cases of ablatio placentae sectioned

(2 per cent of all). These resulted in recovery of all mothers and death of two infants (66 per cent).

The maternal mortality for the high abdominal section was 13.3 per cent, while that for the low section was 9 per cent.

The infantile mortality for the high abdominal section was 10.5 per cent, while that for the low section was 18 per cent.

The maternal mortality for vaginal hysterotomy was 18 per cent. The infantile mortality following the same operation was 63 per cent.

The maternal mortality for all abdominal sections was 13 per cent. The infantile mortality following this procedure was eleven.

TABLE IV. LOW CERVICAL SECTIONS IN DETROIT IN 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Contracted pelvis	3	0	0
Toxemias	3	1	1
Tumors	2	0	0
Previous section	1	0	0
Uterine inertia	1	0	1
Miscellaneous	1	0	0
Total	11	1	2

Of 220 maternal deaths following childbirth in Detroit in 1915, twenty-two died after abdominal or vaginal section (10 per cent of all puerperal deaths).

In the City of Detroit one woman out of every 532 delivered had an abdominal cesarean section for contracted pelvis. This is probably about the rate that should prevail were good obstetrics generally practiced in the city. The errors of commission probably overbalance those of omission in choice of abdominal cesarotomies. A survey of the records in the 61 operations done for contracted pelvis during the year shows that about one-half were definitely indicated. Less than half of the records have measurements to prove contraction! On the other hand, there is no way of determining the number of deliveries by craniotomy or the number of fractured skulls following brutal forceps deliveries in contracted pelves in which abdominal section should have been performed.

During the past two decades the absolute indication for abdominal cesarean section has changed to include all pelves whose conjugata vera is less than 7.5 cm. and all absolutely obstructing tumors. This group is small as only one woman in 6500 had such an obstructing tumor and only one in several thousand had a true conjugata less than 7.5 cm.

The borderline contractions in pelves whose true conjugates are from 7.5 to 9.5 cm. are the majority of pelvic contractions. This group requires careful prenatal care, mature obstetric judgment, and skillful practice in delivery.

In no class of obstetric abnormalities is prenatal care of greater value than in the case of slightly contracted pelvis. Not only is pelvimetry of value but also internal pelvic palpation, the history of previous pregnancies, the apparent size and position of the fetus, and family and racial physical characteristics. One examination is not sufficient to decide the course of procedure and repeated examinations are necessary. In private practice and clinical cases which I see, I try to have my course of procedure in delivery determined before the patient goes into labor. A vacillating or indecisive policy is apt to be disastrous to mother or child.

Pelvic palpation is of great value in these contractions. The shape of the sacrum, the size and form of the promontory, the pars iliacus of the linea terminalis, and the spines, and tuberosities of the ischium are all of importance in anticipation of the progress of labor.

Family traits may be of value also. So the slight fragile mother is apt to give birth to a small child. Or the short, heavy mother is apt to give birth to the stocky, heavy type of child. Also, the heads of certain races as the Slav tend to have the brachycephalic type of head with small fontanelles and closed sutures which tend to prevent proper molding of the head. Other races, such as the Negro, have small heads, large fontanelles, wide, open sutures which help to mold the head even in a markedly contracted pelvis. The tendency to hypo- or hypermaturity, which frequently occurs in certain women, is of importance in judging the best method of delivery.

Almost any usual fetal head will engage in a pelvis whose conjugata vera is 9 cm. or more. For these at least a test of labor is available. Such test consists in permitting the woman to go through the first stage of labor with the necessary support. Then a trial of the second stage for a few hours will permit the head to mold in most cases. During this time only rectal examinations should be made. When one is able to push the head down from above so that the presenting part reaches the level of the spines, one is sure that engagement will occur. Frequently there is obstruction by the membranes; as soon as these rupture, the engagement is apt to follow.

In my private practice about 5 per cent of primiparae do not have the usual engagement when labor commences. If these are proved

TABLE V. VAGINAL HYSTEROTOMIES IN DETROIT IN 1925

INDICATION	CASES	MATERNAL DEATHS	INFANTILE DEATHS
Nephritic toxemia	6	0	4
Eclampsia	2	1	1
Placenta previa	1	0	1
Cardiac disease	1	1	0
Chorea gravidarum	1	0	1
Total	11	2	7

normal during pregnancy, I permit them to proceed as in the cases where engagement has occurred before the onset of labor. In the slightly contracted pelves where engagement has not taken place before labor, I attend them closely, giving the necessary rest, sleep and care until engagement occurs.

One must be sure of diagnosis of position and presentation as such presentations as face, brow or breech are notoriously slow in descent. Also, lack of flexion of the head tends to slow engagement. A posterior vertex usually does not engage until labor is well advanced. Section is ill advised even in contracted pelves without considering these conditions and the wonderful adaptability nature provides for the accommodation of such conditions.

During the years 1906-1924, there were 15,000 deliveries in the Montreal Maternity Hospital, of which 2000 (13.13 per cent) were classed as contracted. The operative procedure and results were as follows:

OPERATION		MATERNAL DEATHS	FETAL DEATHS
Forceps	186	2	16.6 per cent
Version	68	1	30.8 " "
Section	117	5	6.0 " "
Craniotomy	31	0	100.0 " "

This gives an incidence of one section in 128 deliveries with a maternal death rate for these of 4.2 per cent and infantile death rate of 6 per cent. It will be noted that in 2000 contracted pelves only 117 had a section performed (5.8 per cent). This shows that only one woman out of every 17 with a definitely contracted pelvis required a section to be delivered.

E. Holland and Munro Kerr report on 4000 abdominal cesarean sections performed in England in ten years; 3374 of these were for contracted pelvis. The mortality figures were as follows:

1. Not in labor ..... 1.6 per cent
2. Early in labor ..... 1.8 per cent
3. Late in labor ..... 10.7 per cent
4. After induction of labor ..... 14.0 per cent
5. After attempt at forceps delivery ..... 27.0 per cent

ABDOMINAL CESAREAN SECTION FOR ECLAMPSIA

In no condition is cesarean section so contraindicated as in eclampsia or the toxemias of late pregnancy. In this series there were twenty-six abdominal sections performed, resulting in maternal death in eleven instances (42.7 per cent) and five infantile deaths (19 per cent).

Dr. Holland reports a maternal death rate of 32 per cent in 196 sections performed for eclampsia in England and an infantile mor-

tality of 50 per cent. Stroganoff by his method has tended 2000 cases of eclampsia with a maternal mortality of 9.8 per cent and 18 per cent infant mortality.

During the past fifteen months, I have cared for thirty cases of eclampsia without a maternal death, and seven (23 per cent) infant deaths. These were all treated medically by means of sedatives, venesection, diet and elimination.

The woman suffering from eclampsia is a poor surgical risk because of her inferior physical condition, hydremia, and impaired circulation. The babies from eclampties are frequently premature and also suffer from the same toxemia which affects the mother. Also placental hemorrhages produce a higher fetal mortality and morbidity. So infantile mortality is high, even after good care. Those infants born alive have a higher neonatal mortality. So the primary infantile mortality after cesarean section is no better than after medical care.

In this series more than one-half of the maternal deaths following abdominal cesarean section (55 per cent) occurred in cases of toxemia. Is the maternal hazard in this class worth the temptation of a rapid, easy delivery?

Cases in which the indication for abdominal cesarean section was unknown, were twenty-three, or 15 per cent of all. This classification was made to cover those cases in which records were missing or so incomplete as to prevent anyone from being sure of them. In this group four mothers (17 per cent) died and one infant (4 per cent). I wish to emphasize the fact that certain hospitals where sections are done are so negligent of their supervisory function over operations as to permit 15 per cent of all abdominal sections to be performed without a definite record of an indication for that procedure.

TABLE VI. PUERPERAL DEATHS AND RATES PER 1000 BIRTHS IN DETROIT

YEAR	TOTAL BIRTHS STILLBIRTHS INCLUDED	PUERPERAL DEATHS (134-141)	RATE PER 1000 BIRTHS	PUERPERAL SEPTICEMIA (137)	RATE PER 1000 BIRTHS	RATE* PER 1000 LIVING BIRTHS
1911	14,024	105	7.5	56	4.0	7.9
1912	15,087	85	8.3	40	2.5	5.6
1913	18,070	108	6.0	50	2.8	6.3
1914	20,150	116	5.8	56	2.8	6.1
1915	22,235	138	6.2	46	2.1	6.5
1916	25,504	166	6.5	83	3.3	6.9
1917	27,680	157	5.7	87	3.1	6.0
1918	28,491	206	7.2	71	2.5	7.6
1919	26,902	185	6.9	87	3.2	7.2
1920	29,132	254	7.7	96	3.3	9.2
1921	28,992	197	6.8	103	3.6	7.1
1922	27,290	187	6.9	82	3.0	7.2
1923	29,666	196	6.5	104	3.5	7.0
1924	32,166	216	6.7	106	3.3	7.1
1925	33,480	220	6.6	104	3.1	6.9

*Puerperal death rate (all forms).

In the group of sections for placenta previa there were fourteen high abdominal sections with no maternal and one fetal death (7 per cent). This would be conclusive evidence that abdominal section is the best course to pursue in case of placenta previa were it not for the small number of cases recorded. Hitchman in his exhaustive monograph on placenta previa has collected 191 cases of placenta previa which had abdominal cesarean section performed with a maternal mortality of seven (3.6 per cent). He then shows a series of the same conditions treated by bag and version in which 532 women were delivered by this method with only ten maternal deaths (1.9 per cent). As the work was recent and the operators reputed to be skilled obstetricians, the conclusion must be admitted that bagging and version carries one-half the risk for the mother that abdominal section does.

The ease of performance of bagging and the small maternal and infantile risk seems to make it the preferable method of caring for placenta previa. There is a small group, however, in which the cervix is long and fibrous or markedly cicatrized from numerous previous lacerations. In this type the abdominal section is the preferable method because the slowness of dilatation of the cervix by the bag, together with the loss of blood and exhaustion are apt to prove fatal before version can be done.

There were twenty-seven cases in which abdominal section had been performed before (17.5 per cent). These fell into two groups: one in which there was a pelvic contraction; the other in which apparently no abnormality could be found. In thirteen cases (8 per cent) there was a pelvic contraction. There was one maternal death (7.7 per cent) and no infantile deaths in this group. The only course open to the obstetrician in this class is another section, which should be performed before labor commences. It would be foolhardy to tempt fate by testing a uterine scar when an obstruction is present.

In the other group in which a section was done because of a previous section performed without contraction being present, there were fourteen operations (9 per cent of all). Following these were three (21 per cent) infantile deaths and one (7 per cent) maternal death. The previous sections had been performed for placenta previa, ablatio placentae and tumors in four instances. Ten were unaccounted for, however. Apparently 6.5 per cent of the abdominal sections in this series were operated the first time without a good indication.

This group brings the phrase, "Once a section always a section," up for discussion. J. W. Williams has demonstrated that in a perfectly healed cesarean section, regeneration of muscle fibers takes place, and the histologic appearance of the scar is equal to the rest of the uterus. Defective scars and placental erosion of scars, however,

may cause rupture at the site of the previous section. DeLee reports the delivery of ten patients by the natural passages after cesarean section with good results.

The decision as to the course to follow should rest upon (a) the proportion of size of pelvis to fetus, (b) previous operator, (c) character of previous operation, (d) whether there was infection, (e) the apparent dilatability of the cervix.

It is generally accepted that the incidence of rupture of a scar is about 4 per cent, this being the result of Holland's investigation of 18 ruptures in 448 pregnancies at or near term. As 352 of this number were delivered by section, however, actually 96 were allowed to test the scar, and of these 18 ruptured, or 18.75 per cent of those tested by labor.

As DeLee states, however, "If the incidence of rupture of the scar of a previous section is lower than the mortality of cesarean section, it would seem logical to allow these patients, where there is no other indication for a cesarean operation, to go into labor and be delivered by the natural passages. It is of course important, however, that all such patients should be kept under the closest observation during pregnancy and delivered in a well equipped hospital under the personal attendance of an obstetrician qualified to do abdominal surgery."

Under the heading "miscellaneous," eight sections were performed for various pathologic conditions, such as cardiac decompensation, etc. This class could be almost eliminated were all patients given proper prenatal care from the onset of pregnancy through to delivery. Also, skillful obstetric care combined with good medical supervision can usually carry these through labor by delivery through the natural passages.

There were five abdominal sections performed because of obstructing tumors with one maternal death (20 per cent) and no infantile deaths. The majority of obstructing tumors are maternal, either uterine or ovarian. Most of these can be pushed out of the pelvis so as to permit a natural birth. Even such obstructions as adherent ovarian cystomata in the pelvis may be removed by aspiration through the vagina during labor in order to open the natural route for delivery.

In this entire series there was no section performed for an obstructing fetal tumor. Such fetal tumors are of such character as to be fatal to the infant, even if born alive. So, a section for such indication is inadvisable as it subjects the mother to a great risk when a living child is impossible.

In connection with fetal abnormalities, it is important to stress the necessity of fetal radiograms before section is performed. I have

seen four cases of fatal fetal malformations in which section had been considered. It would seem only fair to the expectant mother to be sure that she has not only a living child but a physically normal one before section is decided on.

Section was performed in three instances for ablatio placentae with no maternal and two fetal deaths. At present we are just beginning to realize the frequency of this condition which practically always is caused by toxemia of late pregnancy. Section is the only procedure which can save the maternal life in the severe cases in which there are extensive intramuscular hemorrhages, and little or no uterine contractility. Where placental separation is partial, there is a chance to save the infantile life by section, but not through the natural passages.

The contraindications are probably more important than the indications, as the mortality rates result mostly from performance of abdominal section when it should not have been performed.

(1) The presence of a dead fetus in the uterus is an absolute contraindication, unless there is such disproportion between fetus and pelvis that delivery through the natural birth passage would be impossible. (2) The presence of congenital fetal malformations which would be fatal at or shortly after birth are contraindications for a section. In cases of doubt a radiogram is essential. (3) Section for a premature fetus which is not viable, even though alive at the time of operation, is inadvisable. This is especially true of twin pregnancies in which both die shortly after delivery due to prematurity.

On the part of the mother contraindications are (1) toxemias, which are better cared for medically. (2) After prolonged labor, as Holland and Kerr have shown a maternal mortality of over 10 per cent in this class. (3) After induction of labor where the mortality of Holland and Kerr was 14 per cent. (4) After attempt at forceps delivery where the same authors showed a mortality of 27 per cent. (5) During severe intrapartum infection, which are 50 per cent fatal after section.

In considering the problem of abdominal cesarean section in Detroit, these facts must be reviewed: first, that the death rate in the city from childbirth has not materially decreased in years; second, that the rate of cesarean sections is too high; third, that the death rate from sections performed is too high.

The puerperal death rate for 1925 in Detroit was 6.6 per 1000 births. This was only 1 per 1000 less than the average for fifteen years preceding. This means that during the past year only three less maternal deaths occurred from childbirth than would have occurred had the rate for the other fifteen years prevailed. This proves that the

art of obstetrics has not advanced materially in that period of time in this city.

The fact that cesarean section has been performed for almost every pathologic condition occurring in pregnancy shows how intimately this operation is associated with obstetrics. Not until the standards of obstetric practice are so raised as to materially reduce the puerperal death rate, will an improvement come in the incidence and mortality resulting from abdominal cesarean section.

While it is true that other places and hospitals report a high incidence of cesarean sections, a number of hospitals report low rates even today. George Clark Mosher reports the rate of abdominal sections in the Swedish Hospital, Minneapolis, as 1 to 417, and Burnside Hospital, Toronto, as 1 to 872. The rate of 1 to 217, which prevails for Detroit, is too high in comparison with these hospitals, which receive a relatively higher proportion of abnormal cases than is found in an entire city.

One usually thinks of a maternal mortality of 2 per cent. DeLee reports 145 low sections with only one maternal and two fetal deaths. Herbert Spencer reports four maternal deaths in 120 high abdominal sections with five fetal deaths. Bar reports 97 sections and DePoreta 112 without a maternal death. We should not consider these figures as much as those which prevail for this city now, 13 per cent mortality for mothers and 11 per cent for infants. We should also remember that 10 per cent of all women who died from childbirth died after an abdominal cesarean section. We should also have firmly fixed in our minds that the mortality danger to the expectant mother is 20 times as great in this city as is a delivery through the natural passage. The puerperal mortality rate for 1925 for the city was 6.6 per 1000 deliveries, while that following abdominal section was 130 per 1000!

As all cesarean sections are performed in hospitals, it would seem to be feasible to control the performance of this operation by hospital authorities. As only two of the hospitals in the city are "closed," the majority which are "open" are used by the major part of the medical profession for operative obstetric work. No section should be permitted unless with the approval of an obstetric committee or consultant. Men of mature obstetric judgment, firm will power, and a strong obstetric conscience, should be appointed by each hospital to supervise not only sections but all major obstetric operations. In this way not only could unnecessary cesarean sections be eliminated, but the elements of danger and contraindications could be avoided. So the danger of operating late in labor, which Holland and Kerr have pointed out, could be used in the judgment of the neglected cases.

It should be the duty of the smaller hospitals to secure at least one competent obstetrician to act as advisor and consultant in all abnormal cases.

Unfortunately the public is so educated to operative interference in labor that it readily assents to sections which are not indicated. Even intelligent people request abdominal sections in order to forego the stress of labor, little realizing the possible danger of such procedure, and not understanding that such an operation will limit their future families.

Knowing that abdominal cesarean section in Detroit is a procedure fraught with danger to mother and child, we, as a profession, should educate the public to the dangers of this operation. We should so regulate deliveries in our hospitals that this operation could only be performed after a proper consultation by a qualified obstetrician or group of obstetricians. Only those skilled in abdominal surgery should be permitted to operate, and only those who understand the dangers and complications following this operation should be permitted to care for them.

SUMMARY

A maternal mortality of 13 per cent and infantile mortality of 11 per cent following abdominal cesarean section is too high. These bad results follow the indiscriminate performance of abdominal section by surgeons who do not understand or follow the indications, or avoid the contraindications for this procedure.

Especially in eclampsia is abdominal section to be avoided. In this series a maternal death rate of over 42 per cent is appallingly high when one knows that medical care for this condition can reduce maternal mortality to less than 5 per cent.

A summary of the records for abdominal section in Detroit shows that this procedure is followed too frequently, without proper consultation and without the knowledge of the dangers this operation entails upon mother and child.

497 Grand Boulevard.

PURPURA HEMORRHAGICA COMPLICATING PREGNANCY—REPORT OF A CASE

By Howard W. Hottenstein, M.D., and Walter O. Klingman, M.D.
Cleveland, Ohio
(From the University Hospitals of Cleveland)

THE infrequency of purpura hemorrhagica as a complication of pregnancy warrants the report of a case which first came under observation in the prenatal clinic. That this hemorrhagic diathesis appears in obstetrics as a complication of pregnancy in a form indistinguishable from that described as idiopathic purpura hemorrhagica or, as it recently has been termed, thrombopenic purpura, has been reviewed and reported by Rushmore and others. Rushmore found record of only some forty-odd cases since 1867. Cases in which purpura and the liability to hemorrhage had first appeared during a pregnancy are comparatively infrequent. Although our case corresponded very closely to others associated with pregnancy,—namely, the essential features of diminution of the blood platelets, spontaneous bleeding from the mucous membranes, purpuric skin lesions, delayed coagulation time, increased bleeding time, nonretractility of the clot, positive tourniquet test, and anemia, etc.,—it did not retrogress soon after labor.

The clinical course was that described in most of the other cases associated with pregnancy. The patient was an American, thirty years old, with no history of familial blood dyscrasias. Except for peritonitis following an abortion three years before this pregnancy there had been no serious illness. There had been a previous full term pregnancy resulting in a living child. At her first labor, eighteen months previously, there had been a profuse postpartum hemorrhage but no accompanying purpura. She occasionally had some temperature before the present delivery, crops of petechiae and hemorrhages from the mucous membranes of the mouth. Her blood destruction was progressive. After delivery she had a septic temperature with a profuse lochia. Splenectomy was followed by a lethal exodus. An autopsy was performed.

The patient presented herself at the prenatal clinic July 8, 1925, because of black and blue spots over her body. She gave the following history: Age 30, para ii. First baby which was born March 22, 1924 by forceps, weighed eight and one-half pounds and was followed by a severe postpartum hemorrhage because of which the mother was packed and given saline subcutaneously. She had an uneventful rapid recovery. The first day of her last menstrual period was Jan. 13, 1925; she had some nausea and vomiting during the first two to three months, some edema of the feet and occasional headaches. She thought she felt quickening in June. She had first noticed the appearance of the discolored areas during the fourth month of her pregnancy. There were no subjective symptoms but as her pregnancy progressed the purpuric spots increased in number and size, appearing chiefly over the body and extremities. At first the patient thought them to be due to trauma

because any injury seemed to produce a black and blue spot quite easily. There was no bleeding from the nose but she had noticed some bleeding at the gums. As far as could be determined there had been no melena, hematuria, or hematemesis. Examination at that time revealed the following: the uterus was about the size of a five and one-half months' pregnancy and the fetal heart was 144. The measurements were 20, 25, 27. She had slight edema of the feet and ecchymotic areas over arms and legs. Her teeth were poorly kept and carious. Her blood pressure was 100/58 and the blood Wassermann was negative.

Her second visit to the prenatal clinic was two weeks later at which time the following notes were made: No headache, dizziness, nausea, or vomiting. No edema. Purpuric spots on abdomen and legs. Fundus three fingers above umbilicus, fetal heart 156 in right lower quadrant. The urine showed no albumin. Blood pressure, 110/58. She was sent to Lakeside Hospital for further study and treatment.

Examination on her admission to Lakeside Hospital showed a well developed young woman with petechial hemorrhages and areas of ecchymosis, scattered over the legs and anterior surface of the body, varying in color from red to a dark blue, the largest being from 2 to 5 cm. in diameter. There were also several petechiae on the hard palate and the mucous membrane of the mouth. The heart and lungs were normal. The abdomen was protuberant, the uterus rising midway between the umbilicus and the ensiform. Movements of the child were visible. The spleen could not be felt. No vaginal examination was done. There was slight tenderness on deep pressure over both tibiae. There was no adenopathy.

The blood at this time showed 1,936,000 R.B.C. and 2,350 W.B.C., 25,000 platelets, hemoglobin 36 per cent Sahli. By centrifuge method the red cells by volume corresponded to 2,095,000 cells. Differential count on the blood smear showed 51 per cent polymorphonuclears, 16 per cent large mononuclears, 32 per cent small mononuclears and 1 per cent transitionals. There were no nucleated red cells but there was quite marked anisocytosis. The bleeding time was 4.5 minutes, the clotting time was 4 minutes. The blood calcium was 9.6 mg. per 100 c.c. The blood culture was negative as was the Wassermann reaction. The urine was normal.

Shortly after admission the patient was given a transfusion of 600 c.c. of unmodified blood. The blood, after transfusion, showed 36,000 platelets, 2,268,000 R.B.C., and a hemoglobin of 50 per cent. It was the intention to give the patient several more transfusions but after being in the hospital for about ten days she left contrary to advice.

On her next visit to the prenatal dispensary four weeks later she was very weak and had generalized purpura. She had no headache, dizziness, edema or vomiting. The fundus was three fingers below the ensiform. The fetal heart was 140 in the right lower quadrant; the back on the right, small parts to the left, breech in the fundus and head floating. The urine had no albumin. Her blood pressure was 100/50.

Twelve days later our prenatal nurse visited at her home and found that she was weaker and was bleeding from her gums. Seven days after this she entered Lakeside Hospital on account of increased bleeding from the gums, this being about six weeks after her previous discharge. Examination on this admission showed many bright red petechiae over the abdomen and breasts, none over the posterior surface of the body. Scattered over the legs and upper arms were many discolorations. The skin in general had a distinct pallor and a suggestive lemon-yellow tint. The gums were bleeding and petechiae were present over the mucous membrane of the mouth. The blood findings showed essentially the same features as before: 1,400,000 R.B.C., hemoglobin 30 per cent Sahli. Platelets were 40,000 to 50,000. Red cells by volume were calculated at 1,800,000. The blood plasma was

not icteric. The clotting time by the capillary tube method was six minutes. No new crops of petechiae appeared but when compression of the arm was made by tourniquet a large number appeared below the point of compression. She was again transfused. Because of the proximity of term and the appearance of recurring uterine contractions the patient was transferred to the Maternity service for delivery.

The patient was admitted to Maternity Hospital October 9, 1925, with temperature 38.4° C., pulse 100, respiration 24. Her blood pressure was 116/60. Her temperature came down to normal on the following day and remained so for five days. On the fourth day she noticed pain in the region of the right calf but there was no evidence of a phlebitis. She started in labor at 2:00 P.M. (October 14, 1925.) Uterine contractions were every 2 to 3 minutes. There was no more than normal show. The cervix was fully dilated in twenty minutes. The presentation was an L. O. A. On account of her general physical condition a prophylactic low midforceps was easily done to shorten the second stage. The third stage was completed in five minutes. There was no more bleeding than normal although on account of her previous history and her present blood dyserasia this was looked for. The placenta was double. No vaginals were done. A catheterized urine specimen showed a trace of albumin, many R. B. C., and numerous granular casts.

The baby, a male, needed no resuscitation. He weighed 3320 gm. and was apparently normal. After twelve hours it was put to breast every four hours until the mother's condition did not permit, when it was put on an artificial feeding. The cord dropped off on the third day. The stools were normal. The weight on transfer to the pediatric service was 3185 gm. The child has been under more or less continuous observation up the present time and it is reported that it has never shown any abnormality, has gained in weight constantly and at eight months weighed 8530 gm.

The lochia was profuse and she had an elevation in temperature the day after delivery. Temperature 39.2° C., pulse 96, respiration, 22. She expelled several clots of blood each about 4 cm. in diameter on each of the next four days. She began a septic type of temperature on the third day postpartum and continued this. On the sixth day postpartum she had a slightly offensive lochia. On the fourth and seventh day postpartum respectively, the blood pressure was 122/72 and 106/58. The last two days on the obstetric service the patient's vision was not clear. She became very restless and complained of blindness at times. She had been given fluid extract of ergot to control the lochia.

The patient was returned to Lakeside on the seventh day postpartum having a leucocyte count of 3,500, R. B. C. 980,000 and hemoglobin of 10 per cent. There was no increase of the purpura and the oozing from the gums continued. Examination showed considerable emaciation—the patient having lost 55 pounds in two and one-half months. The right calf was very tender and there was increased heat and some superficial induration. There was also tenderness over the popliteal space but none over the femoral. There were no further new features about her condition except that her temperature remained high and that her anemia was marked. The eyegrounds showed the retinae to be very edematous, and everywhere there were large and small retinal hemorrhages. Transfusions were again given her and her blood was increased to a count of 2,780,000 R. B. C., and the hemoglobin to 50 per cent. The blood studies otherwise were as before.

The advisability of doing a splenectomy was considered in view of the fact that her condition was always retrogressive and operation was decided upon but approached with no great degree of confidence. It was the general feeling, however, that drastic measures would have to be resorted to to produce a cessation of her

hemorrhages. Splenectomy was done, a transfusion immediately preceding the operation. The spleen was found not to be enlarged. Cultures were made from the spleen under careful asepsis within five minutes after its removal and a short chain streptococcus was grown. A blood culture taken just before the operation gave no growth.

Her postoperative condition remained fairly good until the second day when she suddenly became very restless and breathing became difficult for her and she died.

Why the patient failed to recover after the splenectomy is of speculative interest. Transfusion was done immediately before operation but not after operation because of the apparently good condition of the patient and the relatively good blood findings after operation.

The autopsy showed generalized subcutaneous hemorrhages. There was edema, and congestion of the brain. There was a localized chronic fibrous pleuritis, congestion and edema of the lungs with multiple hemorrhages through the lungs. There were petechial hemorrhages in the epicardium and anemia of the heart muscle and mild atherosclerosis of the aorta. There was an acute parenchymatous degeneration of the kidney, petechial hemorrhages of the kidney surfaces and bilateral hemonephrosis, and petechial hemorrhages in the ureters. There were also petechial hemorrhages in the gastrointestinal tract. There was an acute necrotic endometritis.

61 Forrest Avenue.

URINARY DISTURBANCES FOLLOWING GYNECOLOGIC OPERATIONS*

By Isador W. Kahn, M.D., New York City, N. Y.

(Associate in Gynecology, New York Post-Graduate Medical School and Hospital; Attending Gynecologist, Home of the Daughters of Jacob)

MY PURPOSE in presenting this paper is to call attention to the fact that surgical operations in the female pelvis are often followed by urinary symptoms, some mild and amenable to treatment, others severe and frequently intractable. Although the annoyances for which a particular operation was done may be relieved and the patient cured, she may present herself shortly thereafter with a new complaint which manifests itself as a urinary disturbance. Careful investigation of many such cases has revealed involvement of either the bladder or ureter or both in a large percentage. The symptoms complained of by these patients varied from a mild dysuria or frequency, to urgency, strangury and vesical tenesmus. In several instances the macroscopic appearance of the urine suggested hematuria, pyuria or bacteriuria. After questioning these women it was found that they usually traced their disorders back to a previous surgical operation, to an abortion, or to an operative delivery.

My report includes a study of one hundred and forty-six patients who had been operated on for various pelvic disorders and presented

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themselves to the female cystoscopic clinic on the service of Dr. Walter T. Dannreuther at the New York Post-Graduate Hospital. Our female cystoscopic clinics are included in the Department of Gynecology. All of our own cases operated upon at the hospital are cystoscoped before operation, the kidneys and ureters being investigated if necessary. In the cystoscopic clinic, however, we also receive women with urinary disorders from sources outside of our own institution and the observations in my report are based largely upon this material. The operations preceding the urologic complaints embrace supravaginal and complete abdominal hysterectomy, ovarian cystectomy, interposition operation for prolapse and cystocele, intracervical radium applications and cesarean section. I have also found it necessary to refer to the etiologic importance of endocervicitis and abortions. This series of one hundred and forty-six cases is made up as follows:

Thirty-four presented themselves with urologic symptoms after hysterectomy.
Eight after interposition operation.
Six after cesarean section.
Two after the use of radium in the uterus.
Nine after large ovarian cysts.
Six after high amputation of the cervix.
Twenty-seven after abortion.
Forty after endocervicitis.
Fourteen after salpingectomy or oophorectomy or both.

It is probable that the observations I have made have come to your attention before but their relative frequency prompted me to submit the results of a detailed study for the purpose of stressing some of the etiologic factors concerned in these urinary disturbances.

The anatomic relations of the bladder as well as those of the lower third of the ureter to adjacent organs are of special importance and there are several characteristics of a female bladder to be kept in mind. The minimum, maximum and average capacities are less than that of the male, being 200, 1000 and 650 c.c., respectively. The wall of the bladder of the female is thinner than that of the male. When relaxed and empty the vertex drops down close to the base. If seen on sagittal section it is "Y" shaped, the stem of the "Y" being the urethra. This is chiefly due to the fact that the fundus uteri rests on the bladder when it is empty. The longer anterior arm rests against the symphysis and the shorter posterior arm against the vagina and cervix. As the bladder distends, the vertex is gradually lifted up from the base, which expands downwards and backwards, while the lateral walls stretch towards the pelvic walls in each side. Because of the limited space in the bony pelvis the transverse diameter reaches its maximum sooner than the other measurements. The upper half, and part of the posterior portion of the bladder are covered with peritoneum

and as the distention progresses, the vertex rises over the symphysis and carries the line of peritoneal reflexion upward. This brings the extraperitoneal portion of the bladder up to the suprapubic region. When fully distended, the bladder is ovoid, with the long axis pointing toward the umbilicus. When excessively dilated, the vertex may reach the level of the umbilicus; the peritoneal reflexion is then about 10 cm. above the symphysis. Although the peritoneal covering is limited to the upper surface, it dips down slightly on the sides and behind, thus forming a fossa on each side between the bladder and pelvic wall, round ligament and uterus. These lateral paravesical fossae are crescent shaped, and traversed by the converging obliterated hypogastric arteries. The extraperitoneal lower surface is supported by the rectovesical fascia and pubic bones with loose areolar tissues intervening. The trigone rests against the upper end of the vagina and cervix. The meshed areolar tissue found everywhere at the base of the bladder facilitates its mobility and is most marked in the prevesical area; the space of Retzius.

Beginning at the renal pelvis, each ureter runs downward, slightly median and forward, across the psoas muscle, where it passes under the ovarian vessels. The right ureter passes nearer the vena cava than the left does the aorta. The upper portion is known as the abdominal part and rarely concerns the gynecologist. After crossing the iliac vessels the ureters become pelvic and here they lie about 6 cm. apart, approximating as they approach the bladder. After crossing the iliac vessels they curve backward and outward following the contour of the pelvis. They pass in front of all the large vessels, reaching their most lateral point as they cross the obliterated hypogastric arteries opposite the ischial spine. Now running downward and slightly forward and mesially, they pass beneath the uterine and superior and middle vesical arteries and skirt the cervix and vaginal fornix until they reach the trigone of the bladder. Approaching it from each side, they obliquely perforate the bladder wall for about 2 cm. until they open on the mucous membrane about 3 cm. apart. The ureters are covered in front by peritoneum, except when passing under the mesentery or the extraperitoneal surface of the terminal ileum on the right side, and the sigmoid flexure on the left. The ureter is about 1 cm. shorter in the female than in the male usually spanning 28 cm. on the right, and 29 cm. on the left side. The diameter is about 5 cm. and the lumen is star-shaped because of the muscular folds projecting into it. The caliber is not uniform throughout, being relatively constricted and dilated at several points.

In a consideration of the bladder and ureteric involvements concerned in the causation of postoperative urinary disorders, it seems desirable to discuss the more important operative procedures individually:

Supravaginal Hysterectomy.—After the upper portion of the broad ligaments are divided, the vesicouterine fold of peritoneum is lifted from in front of the uterus and cut across. The bladder is then pushed off the uterus with either the gauze-covered finger or gauze held in sponge forceps. If this particular step is not carried out with extreme gentleness and care there may be a distinct traumatism to the bladder peritoneum and wall. The separation of bladder from the anterior surface of the uterus is usually an easy matter if the peritoneum is divided within the area of loose attachment, which extends up on the anterior surface of the uterus considerably beyond the vesicovaginal fold but annoying difficulty in this separation is caused if the cut across the peritoneum is made above this loose area. The dissection should always be continued down to the upper part of the cervix and then still lower if any tumor nodule lies in the cervix. Failure to recognize and remove a tumor nodule in the cervical tissue has been responsible for two of my cases of intractable cystitis, and encroachment on the bladder from subsequent enlargement of the tumor necessitated reoperation. I have cystoscoped patients after supravaginal hysterectomy who have been unable to void voluntarily and found patches of congestion and hemorrhage corresponding to the area of bladder separation from the uterus. This region revealed evidences of traumatism to the bladder wall instead of a clean dissection or separation. In the later stages a distinct cystitis may develop with the coincident urinary symptoms.

Complete Hysterectomy.—In this procedure there is a further separation of the bladder, the separation being carried sufficiently downward to expose the upper part of the vagina as well as the cervix. Before or after the uterine vessels are divided, the bladder is pushed well off the cervix and broad ligaments laterally. This is essential to keep the bladder and lower part of the ureters out of the way when the forceps and ligatures are applied to the broad ligaments subsequently. To determine whether or not the separation of the bladder downward and laterally has been carried far enough, place the thumb in front and the fingers behind the vagina, and locate the lower margin of the cervix by palpation. This procedure will determine the amount of bladder separation required. Again it is well to emphasize the necessity for gentleness and care in mobilization of the bladder and extreme caution in the use of clamps. The possibility of damaging the ureters when dividing the tissues lateral to the cervix should not be forgotten. Crossen recommends the employment of short instead of long bites with the forceps, as the ligatures are then more easily applied. Two or three bites on each side are usually required to free the cervix down to the vaginal wall. Careful palpation of the cervix will decide whether or not the division has been carried far enough. To

prevent slipping of the clamps, strong pressure forceps, preferably toothed, should be used.

Ovarian Cysts.—These include the usual and unusual types of cysts, i.e., pseudomucinous, which may be the ordinary variety, or the type that is densely adherent, the dermoid, and the papillary cyst. At the same time we may also consider the solid and the malignant tumor of the ovary. In all such cases it is prudent to remember that a large incision gives a better exposure of the tumor and adjacent structures which are often adherent to the cyst or tumor. The bladder is often drawn up by the tumor, and it is always wise to incise the peritoneum high up. After the bladder has been identified, the peritoneum can be incised downward. A small incision or opening the peritoneum too low may cause accidental wounding of the bladder.

Parovarian Cysts.—The simple parovarian cyst grows between the layers of the broad ligament and is confined within these peritoneal layers. In its early stages it displaces the uterus and bladder and thus causes pressure symptoms. The enucleation of this tumor leaves a large cavity in the broad ligament into which considerable postoperative oozing may occur, if strict attention is not given to hemostasis. Hemostasis is best obtained by securely ligating the pedicle, and approximating the sides of the cavity with sutures, the operator should always bear in mind the location of the ureters in placing these sutures, otherwise the ureters may be inadvertently included in the sutures. In this type of cyst, it is a good plan to pass catheters into both ureters and leave them in situ throughout the operation. This extra precaution will avoid the disaster of tying off one or both ureters.

Transposition of the Uterus.—Subvesical interposition of the uterus for cystocele alone or for combined cystocele and uterine procidentia has resulted in postoperative vesical complications in this series. I have had the opportunity of studying eight cases of bladder disturbance following this operation. Upon cystoscopic examination, some bladder distortion with an accompanying cystitis was evident. At this time I wish to refer to some interesting observations made by Daniel R. Ayres, in a paper published in 1917, calling attention to the deleterious after-results of this operation. They refer particularly to the effects on the bladder, and cases were reported suffering from cystitis, stone formation, and vesical tenesmus. In a later paper published by Johnson of Boston, thirty-two cases were reported, where by modifications of technic, these bladder sequelae were claimed to have been overcome. However, I cannot agree with his conclusions. The cystoscopic picture in my cases invariably revealed an elevation of the base of the bladder, with sacculations on either side. These pockets were the sites for an accumulation of residual urine, which underwent decomposition, and resulted in a localized cystitis. I be-

lieve that a uterus larger than a six weeks' pregnancy is not adaptable for transposition. Such uteri are often found in cases of chronic metritis, subinvolution, and where submucous and intramural fibroids exist. Preliminary reduction in size by removal of fibroids is not advisable, and hysterectomy is the preferable procedure. Reduction of an enlarged uterus by the excision of part of the uterine wall together with the endometrium, is not a procedure favored by most operators. Culbertson has reported a fatal result in one case in which he resorted to this method.

In cystocele and prolapse of the uterus, the fascia is usually weakened and thinned out, and if we transpose an enlarged uterus, the weight of the uterus will tend to produce a recurrence and carry the bladder with it. A resected uterus is a traumatized uterus and how this uterus will behave after operation is entirely speculative, because of the possibility of infection, which sometimes follows when the endometrial cavity is opened. Reduction of the size of the uterus by resection has an extremely limited application, and is feasible only in those cases in which, after the vaginal delivery of the uterus one or more subserous or pedunculated fibroids are discovered. In one of my cases, the bladder had a capacity of 1000 c.c. and when fully distended with boric acid solution, the top of the bladder was at the level of the umbilicus. One can readily see that with such a large bladder, sacculation is inevitable. I believe that every bladder should be carefully studied with reference to its size and capacity as well as for evidence of pathology, before this operation is performed. This implies a careful cystoscopic examination, a culture of urine, and sometimes even a cystogram. I am fully convinced that cases of procidentia associated with cystocele have some coincident cystitis and that a bladder so affected should be given a series of bladder irrigations and instillations before an interposition operation is done. These precautionary measures will promote postoperative convalescence and lessen postoperative morbidity. I have recently visited several large gynecologic clinics and discussed this matter with many representative gynecologists. Most of them seem to feel that this operation should only be done in carefully selected cases, and I believe that they are resorting to this method of curing procidentia and cystocele much less often than they have in the past.

Cesarean Section.—While I do not intend to delve into the realm of obstetrics, it is necessary to mention that six patients in these series presented themselves with bladder symptoms following delivery by cesarean section. On cystoscopic examination, one case showed marked distortion of the bladder wall; another, a herniation of the abdominal wall at the site of the abdominal incision, with a false sacculation of the bladder, and the other cases showed an intractable cystitis. One of these cases of cystitis dated back six years to a

cesarean section, when her first and only child was born. All of these cases had scars below the umbilicus, but I was unable to ascertain definitely the type of operation performed. However, it has been my experience that the low cervical cesarean section is the technic most likely to be followed by bladder disturbances. The bladder may be injured as a direct result of either hasty separation of the bladder from the lower uterine segment, or direct traumatism by cutting instruments. There is really no need for unusual haste in carrying out the several steps of cesarean section. The only time when haste is necessary is between incising the uterus and extracting the child. This period may be one of danger to the child, especially in those cases in which extensive separation of the placenta is necessary before the hand can be introduced into the uterine cavity. The bladder is probably jeopardized more in the extraperitoneal than the high cesarean section. In these cases it is sometimes wise to distend the bladder with sterile salt solution, or boric acid, before the abdomen is opened, so that it may be easily identified. Since drainage is occasionally instituted in this type of cesarean section, postoperative adhesions may follow. This increases the likelihood of bladder involvement later on. The ideal cesarean section is an elective operation. When done as an emergency procedure, careful technic should not be sacrificed for haste.

I am personally opposed to postoperative routine catheterization in the first thirty hours after cesarean section, as the average amount of urine collected during the first twenty-four hours is usually less than twenty-five ounces. In the majority of cases the patient will be able to void spontaneously, if measures are used to encourage voluntary urination. But if she fails to void despite these measures, she should be catheterized. When repeated catheterization is necessary, she should be given a urinary antiseptic. As an added precaution against bladder infection I would recommend irrigation of the bladder once or twice daily with a mild antiseptic solution, such as boric acid 2 per cent or mercury oxycyanide 1:8000. Cystitis will rarely develop in a case so treated. If the patient cannot void at all, she should be catheterized every eight hours. In the few cases in which bladder irritability does appear, I would recommend the instillation of two ounces of a 5 per cent neosilvol solution once a day. This will usually relieve it promptly. It is inadvisable to discontinue catheterization as soon as spontaneous urination is reestablished, because the bladder may not empty itself completely. The catheter should be used once a day, for two or three days, because a residual urine may remain after voiding. This predisposes to infection and may be responsible for a subsequent cystitis. The course of procedure I have outlined refers only to those cases in which catheterization for several days has been imperative.

Bladder Involvement Following Abortion and Endocervicitis.—While not strictly pertinent to the subject, I do not think this paper would be complete without some reference to two conditions that have been responsible for bladder and sometimes ureter involvements in many cases: septic abortion and chronic endocervicitis. In these cases the bladder or the ureter becomes involved by extension of infection through the lymphatics or by contiguous inflammation. A survey of the lymphatics of the uterus, ureter and bladder reveals the intimate communication between these organs through their lymphatic chains. The lymphatics of the posterior bladder wall drain into the internal iliac, hypogastric and sacral glands. The lymphatics of the uterus are divided into two groups: those of the body join those of the tube and ovary and drain into the lumbar glands, while those of the cervix join those of the upper vagina and drain into the hypogastric, sacral and superior iliac glands. The intimate lymphatic relation of the uterus and bladder is obvious and a frank infection of the cervix can be readily transmitted to the bladder and ureter. I have seen many cases of bladder disturbance associated with infection of the cervix. Most of them, whenever treatment was directed to the cervix and the endocervicitis lessened, the bladder symptoms improved or disappeared. However, some of these patients returned with a recrudescence of bladder symptoms at a later date, and speculum examination of the cervix revealed a renewed activity of the cervicitis. In such cases a tracheloplastic operation was done, and in each instance the bladder condition was permanently relieved by the operative procedure. In cases of bladder involvement following septic abortion, cystoscopic examination disclosed an acute cystitis of moderate severity, probably as a result of direct lymphatic extension from a metritis or from a contiguous pelvic cellulitis or parametritis. After the use of remedial measure to reduce pelvic inflammation and engorgement (such as rest, ice bag and enemata, and later pelvic depletion by vaginal packing), the bladder became normal as the pelvic inflammation subsided. However, the bladder itself was treated locally.

Bladder Involvement Following the Use of Radium in the Uterus.—Two patients in this series presented themselves with bladder involvement following the use of radium. One received radium in the cervix for what was diagnosed as a carcinoma but no biopsy examination was made in this case. The other patient a young unmarried girl had been given radium for intermittent uterine bleeding of unknown origin. In both cases, cystoscopic examination disclosed the following findings: an irregular patch of ulceration on the floor of the bladder, behind the trigone in the median line. This patch was elevated and indurated. In the case that received radium for carcinoma of the cervix, the margin of the ulceration showed distinct edema, with hyperplastic tissue covering the ulcer and simulating a carcinoma. By

repeated washings of the bladder I secured several pieces of tissue for microscopic examination. They revealed no evidence of carcinoma. It is now four years since the radium treatment and she is in perfect health, except for an occasional return of bladder symptoms. I have had an opportunity to study bladder involvements following radiation of the cervix in several other cases, but in these the reaction was mild and rapidly responded to treatment.

It might be worth while to refer to the technic of radium application used on this service at the Post-Graduate Hospital. Briefly, this is as follows: Every patient upon whom radium is to be used is subjected to a thorough physical examination. The condition of the kidneys, bladder, and rectum is carefully investigated. Physiologic functions are carefully determined before the radium is used. Intensive radium is not applied to the uterus unless we are sure that the excretory organs of elimination are capable of functioning reasonably well during the period of destruction of the neoplasm. Cystoscopy and proscopy are useful, even though the patient is free from bladder or rectal symptoms, to make sure there is no unrecognized bladder or rectal involvement. Renal function is checked by means of an indigocarmine function test, and the catheterized urine from each kidney carefully examined.

The external genitals are prepared as for any major gynecologic operation (parts shaved and iodized). As a rule the cervix is not dilated before the insertion of radium. A special long and slender carrier that slips easily into the cervix is used. Under no circumstances is the Goodell or any other branched dilator employed. In the few instances in which dilatation is necessary, it is accomplished by the gentle introduction of bougies of increasing caliber.

After the radium has been deposited into the cervix or corpus uteri, and its position fixed, the bladder is emptied and kept empty by the insertion of a specially designed, right-angled Pezzer catheter. The vesical and rectal areas are firmly packed off with iodoform moistened gauze. The iodoform gauze is never used dry as it causes a sensation of vaginal irritation and burning. One strip of gauze is introduced into the posterior fornix and another into the anterior fornix. Adjacent viscera should not come within two cm. of a radium applicator. Additional gauze is packed in, so that the entire uterus is pushed up out of the pelvis as far as possible. It is unwise to use radium for benign conditions just before the menstrual period as the bladder often participates in the premenstrual congestion.

Postoperative Care of the Bladder.—The protection of the urinary tract constitutes one of the most important features of postoperative care following surgery in the female pelvis. Following an abdominal section in which the bladder has been mobilized or sutured, as in hysterectomy, or a plastic operation, the bladder contents should be

inspected before the patient leaves the operating table. This is accomplished by inserting a catheter and inspecting the urine for macroscopic blood. A nontraumatized bladder lessens the probability of postoperative morbidity and bladder disturbance. It has been my experience that after abdominal section, most patients have been able to void spontaneously. A small percentage must be catheterized. According to Curtis, 60 per cent of his patients, subjected to major gynecologic operations, required no catheterization, 11 per cent required it once, 5 per cent required it twice, and 17 per cent required it three or more times. If a patient does not void spontaneously after operation, measures may be instituted to induce and stimulate urination. It is encouraged by local hot applications, by steaming hot water poured into the bed pan, by external douching with hot water, and other autosuggestive measures. Sometimes an application of a stimulating substance to the meatus, such as a drop of spirits of camphor is helpful. Diuresis may also be encouraged by the copious drinking of hot water, if all vomiting has ceased. I personally favor filling the peritoneal cavity with normal saline solution, sometimes using a quart, before closure of the abdominal wound, as a matter of routine. This usually accomplishes the following:

(a) Shock is usually minimized.
(b) The loss of fluid from incidental bleeding is promptly made up.
(c) Excretion via the kidneys is prompt in most cases.

Saline enemata as well as the Murphy drip are also very useful in promoting diuresis. The use of pituitrin, given in 0.55 c.c. doses by hypodermic injection, and repeated in three hours if necessary, is of value in those cases that have failed to void spontaneously. This procedure has served me well in many instances. Catheterization can be delayed for every twelve hours, while attempts at promoting urination are made every eight hours.

Since it is more difficult for a patient to void while lying down, I have tried having the nurse support the patient in a sitting or reclining position on the bed pan with considerable success. When the patient once regains her ability to void, she usually continues the desire regardless of position. Sometimes we see a patient who is unable to void spontaneously so long as she is confined to bed, but does so promptly on arising. The temperament of the patient is also a factor, as urinary difficulties are often associated with a neurosis.

The first specimen voided after operation should be saved and inspected for macroscopic and microscopic blood. This will often suggest whether or not there has been any undue traumatism to the bladder wall, or if there has been any bleeding from a suture line in the bladder itself. After that the urine should be examined twice weekly for mucus, pus, and microorganisms, so that cystitis can be detected early. There is usually some vesical irritability during

the first three postoperative days which is often due to the diminished urinary output and consequent concentration of urine. This should not always be construed as denoting a beginning cystitis.

Aseptic technic of catheterization should be faultless. I do not use a glass catheter and prefer a Furniss metallic catheter. When it is necessary to keep the bladder at rest or maintain drainage, because of bladder trauma or plastic operations involving the bladder, I have followed the practice of Dr. Dannreuther and used the self-retaining right-angled Pezzer catheter. This is allowed to remain in situ as long as necessary. To make sure that the free drainage of the bladder continues, and that the lumen of the catheter is open, it is wise to inject an ounce of boric acid solution twice daily through the catheter.

Catheterization should be performed by a competent nurse, and should be gentle and free from trauma. If the patient struggles because of nervousness, pain or hysteria, or if she is delirious, a member of the house staff should supervise and direct the catheterization. If a cystitis follows catheterization in postoperative gynecologic cases it is really not due to the catheterization. I agree with Curtis and others, that it is due to contamination of residual urine. Of the 66 per cent of patients in whom Curtis found catheterization unnecessary, less than 1 per cent had residual urine. But of the 17 per cent that required instrumental emptying of the bladder three or more times, residual urine was found in about 66 per cent of the cases. The amount of residual urine decreases as the bladder regains its power of complete evacuation. My plan of procedure in postoperative cases in which no plastic operation involving the bladder has been done is to allow the patient to go twelve to fourteen hours before catheterizing. Thereafter the measures previously mentioned to stimulate voluntary urination are employed every eight hours, and if they prove of no avail the patient is again catheterized. After plastic operations on the bladder such as for cystocele, prolapse or repair of vesicovaginal fistula, my plan is to resort to the Pezzer catheter for seven or nine days in the latter and interrupted catheterization in the former as follows: For the first forty-eight hours the patient is catheterized every six hours, for the next six days every eight hours, and then every ten hours up to the tenth day, and then allowed to void. She is usually allowed out of bed on the twelfth day. Following all catheterizations, it is a routine procedure to instil one ounce of 2½ per cent neosilvol solution. Patients also receive a urinary antiseptic. I have preference for formohydrion tablets (Upjohn), which is an acidified urotropin, given every four hours by mouth, in five grain doses. This medication does away with the giving of sodium phosphate or benzoate to acidulate the urine.

CONCLUSIONS

1. Many operations on the female pelvic organs are followed by urinary disturbances of various degrees of intensity.

2. These disturbances are often the result of trauma to the bladder and its fascial attachments; to traumatism of the bladder by sutures or instruments or to failure to identify the ureter during operation.

3. Faulty technic or errors of omission in postoperative catheterization are probably responsible for some postoperative cases of cystitis.

801 West End Avenue.

A STUDY OF THREE HUNDRED PREGNANT NEGRO WOMEN HAVING A FOUR-PLUS WASSERMANN

A SUMMARY OF SIX HUNDRED CASES

By J. R. McCord, M.D., Atlanta, Georgia

(From the Department of Obstetrics, Emory University School of Medicine)

PART of the data obtained in this study will be summarized with the results obtained in a similar study and published in this Journal, June, 1925. We then have the results of a study of 600 consecutive cases of pregnancy, all having a four-plus Wassermann reaction.

RESULTS OF PREGNANCY OBSERVED IN THREE HUNDRED WOMEN

Fifty-seven, 19 per cent, of the babies were born dead. Seventeen babies died in the hospital. Twenty-nine, or 10 per cent were aborted. If we add the stillbirths, the babies who died in the hospital, and the cases that aborted, we learn that pregnancy ended disastrously 103 times, or in 34 per cent of the cases. In our prior series there was a similar result in 32 per cent of the cases.

Of the 57 women who had stillbirths, 46 had had no antisyphilitic treatment. Of the 29 women who aborted, 27 had received no treatment. Seventeen babies died in the hospital and the mothers of 13 of these had received no prenatal treatment.

Prenatal visits and treatments.—In this series 160 women attended the prenatal clinic one or more times. Of these 160 women only 99 took antisyphilitic treatment. The treatment in most cases was insufficient, as Table I shows.

In so far as we know, not one severe reaction occurred; and we again repeat that we have no hesitancy in giving pregnant women with syphilis, antisyphilitic treatment.

TABLE I

NO. WOMEN TAKING TREATMENT	NO. DOSES NEO-SALVARSAN	NO. MERCURIAL INUNCTIONS
12	1	1
17	2	2
14	3	3
7	4	4
10	5	5
8	6	6
7	7	7
6	8	8
6	9	9
5	10	10
4	11	11
2	12	12
1	13	13

Histologic studies of the placenta.—Of the 222 placentas examined, 87 (39 per cent) were positive, and 135 were negative. Twelve placentas were doubtful and not listed above. Of the women who had no prenatal treatment, the placenta was negative 80 times, positive 55, and doubtful 4. Those women who had efficient treatment had 21 negative placentas, 6 positive, and 1 doubtful. Of the women having moderate treatment, 19 were negative, 7 positive and 1 doubtful.

Examination of the babies by Roentgen-rays.—No live babies were x-rayed in this series. Pictures were made on 66 dead babies and 34 (52 per cent) gave the characteristic lesions of syphilis. This agrees with some autopsy work we are doing, in which we will show that over 51 per cent of stillbirths occurring in our service are due to syphilis.

Dark-field examination of liver.—Secretions were obtained from the livers and examined by the dark-field method 58 times. The organism of syphilis was demonstrated in 39, or 67 per cent.

Maceration.—Forty-four of the 57 stillborn babies were macerated. In our last series only 42 per cent were macerated. We have no explanation to offer for this divergence.

Mortality.—Two mothers died; one of general peritonitis (puerperal sepsis), the other with eclampsia and lobar pneumonia.

Fetal autopsies.—Autopsies were done on 67 of the 74 babies. The results of this histologic work will be reported later.

A SUMMARY OF SIX HUNDRED CASES

Thirty-five per cent of the births were premature.

Thirty-three per cent of the cases ended in disaster.

Twenty-five per cent of the cases had a hypertension.

The placentas were positive for syphilis in 43.5 per cent of 320 examined.

61 FORREST AVENUE.

SPONTANEOUS RUPTURE OF A CESAREAN SCAR*

By Hervey C. Williamson, M.D., New York, N. Y.

(From the service of Dr. J. Clifton Edgar, Manhattan Maternity and Dispensary)

THE healing of the uterine incision after a cesarean section probably takes place, as described by Couvelaire, and Schwarz and Paddock, first by a deposition of fibrin and then by fibroblastic proliferation. In the perfect scar there has to be good wound apposition, then the line of the scar is small and as it contracts it assumes the appearance of the normal uterine wall.

Any interference with the healing will cause an abnormal amount of connective tissue which will result in a weak scar that may separate during pregnancy or labor. Infection is the usual cause. Projection of the endometrium outward into the muscle will also weaken the scar.

The incidence of cesarean scar rupture is given by Holland as 4 per cent. In 78 of his 87 cases the rupture occurred within one month of term and in 34 of the 51 cases in which the location of the placenta was stated, the placenta was under the site of the rupture.

CASE REPORT

The patient under discussion, B. M., age thirty-three years, was admitted to Manhattan Maternity and Dispensary November 3, 1926. On May 10, 1921, the patient had a high classical cesarean in this hospital, following a prolonged labor. The convalescence was febrile for ten days and during this period bronchopneumonia developed. The patient was discharged in good condition on the eighteenth day following the operation.

The last menstrual period was January 30, 1926 and the calculated date November 6, 1926. The antenatal period was normal. On November 3 at one o'clock in the morning she was suddenly seized with abdominal pain of moderate severity, like a "gas pain." This was soon followed by vomiting and marked weakness. She was brought to the hospital in a taxicab.

On admission, one hour later, the patient was in moderate shock, there was pallor, the pulse was 105 and thready, the blood pressure 90/60. There was a generalized tenderness of the abdomen and both flanks were dull on percussion. It was noticed that the outline of the uterus protruded irregularly at the site of the abdominal scar. The fetal heart was definitely heard in the lower left quadrant, 60 per minute, but very irregular.

At 3 A.M. the patient was conscious with marked pallor and beads of perspiration on the forehead. The pulse was scarcely perceptible, 130 and the blood pressure 80/56. The entire abdomen was dull on percussion, very tender, and it was impossible to map out the fetus on palpation. By rectal examination the head was found to be in the upper pelvis, the cervix thick, and one finger dilated. The fetal

*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, November 23, 1926.

heart was no longer heard. Morphine sulphate, .015 gm. was given, saline, 1000 c.c. by hypodermoclysis and 1000 c.c. of tap water by rectum.

At 5:40 A.M. she was transfused with 950 c.c. of blood and at the same time the operation begun. The anesthetic was gas and oxygen with a little ether. On opening the abdomen in the midline below the umbilicus, many large clots were found over the entire anterior aspect of the uterus. These were removed and an opening in the uterus, at the site of the former scar, was found. This was oval in outline, about 8 by 10 cm. and the placenta was in this opening. The placenta had separated at the right margin causing the hemorrhage and there were about two liters of clotted and free blood in the peritoneal cavity. The hand was passed through the placenta, the membranes ruptured and a dead baby was delivered. It was necessary to enlarge the opening at either end. The baby, curiously, promptly developed rigor mortis. A rapid supravaginal hysterectomy was performed. The abdomen was then closed in the regular manner.

After the operation, the blood pressure was 78/50 and her general condition was no worse than before. The blood pressure gradually rose to 100/70 at 10:30 P.M. and was 120 mm. the following day. During the first three days there was considerable abdominal distension which was relieved by enemas. The urine was voided spontaneously. The temperature range was 98.6° to 101°, becoming normal on the thirteenth day. The sutures were removed on the tenth day when the abdominal wound was found perfectly healed.

Dr. Ewing kindly examined the microscopic slide made from the margins of the scar. His findings were: fibrosis and atrophy of the muscle tissue, chronic inflammation, leucocytic infiltration, dilation of the veins, decidual cell infiltration on the inner surface. The opening was due to gradual mechanical atrophy.

This case shows a spontaneous rupture, three days before term, of a cesarean scar with hemorrhage from placenta separation. There were no premonitory symptoms. The scar was undoubtedly defective from infection after the first operation. In this type of case it seems advisable to operate seven to ten days before the estimated date of labor.

REFERENCES

(1) *Couvelaire:* Quoted by Schwarz and Paddock. (2) *Schwarz and Paddock:* AM. JOUR. OBST. AND GYNEC., Aug. 1925, x, No. 2, p. 153. (3) *Holland, E.:* Jour. of Obst. and Gynec. of Brit. Emp., 1922, xxviii, 488.

34 EAST SEVENTY-FIFTH STREET.

Society Transactions

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF OCTOBER 12, 1926

THE PRESIDENT, DR. GEORGE H. RYDER, IN THE CHAIR

DR. E. A. BULLARD reported a case of **Psychic Amenorrhea.**

Miss J. T. began to menstruate at eleven years of age. Her epochs were regular every thirty days, quite profuse, painless and of six days' duration. She was robust, of an energetic, nervous type, and had had only minor ailments. Her daily life was easy, happy and free from strain until her thirtieth year. Then suddenly, while traveling with her family in Africa, her mother died. This was a great shock in itself but in addition the entire care of her invalid psychopathic father fell to her. The strain was enormous, he was violent, unreasonable, and exacting, and would have no nurse but his daughter.

She never menstruated after the death of her mother, in 1913, and had none of the molimina. During the following eleven years she had two nervous breakdowns and was treated in sanitaria by rest cures. On these occasions her weight went up twenty pounds or more, and great improvement occurred in her general health, but menstruation never appeared. No medication was taken at any time directly for the amenorrhea.

In September, 1924, a perfect attendant was at last secured for the invalid father and all responsibility was lifted from the daughter. Then began a period of great happiness; she attended many theatres, concerts and dinners and also secured plenty of rest and sleep. From Jan. 30 to Feb. 1, 1925, a scanty menstrual epoch occurred after eleven years amenorrhea. February, March and April epochs followed at twenty-eight day intervals, painless, of five-day duration and of normal amount. May and June periods were five weeks apart, July and September were skipped entirely, but since then every epoch to the present writing has been normal.

Dr. Bullard first examined this patient in February, 1925. The uterus was forward and of normal size, shape and consistency; the cervix was of normal nulliparous appearance; the ovaries felt to be of average size and not tender; in fact, there was not an abnormal feature to be found anywhere about the internal or external genitalia. As he had doubts about the alleged menstruation, the patient returned for observation during her March and April periods and a bloody flow from the cervix was quite characteristic of menstruation.

In the absence of any demonstrable pathology and in consideration of this striking history it seems highly probable that this is a case of amenorrhea of psychic or nervous etiology.

DR. HOWARD C. TAYLOR said he had a similar case two years ago, a girl, in the early twenties, who had had a sudden mental shock when she saw her mother killed suddenly. She stopped menstruating at once with no return of the menstruation after a number of months. Examination of this girl showed that the uterus was the size of the senile organ, and Dr. Taylor asked whether the uterus in his case was reduced in size or whether it remained normal.

DR. H. C. COE said he recalled the case of a neurotic patient who had had an operation for gall bladder disease and following that menstruation stopped. She was then admitted to the Woman's Hospital for persistent pain over the cicatrix. She had not menstruated since the operation which had been done over a year before. He separated the adhesions along the cicatrix and removed the appendix, which was adherent, and about two months afterwards she began to menstruate regularly. The pelvic organs at the time of the operation were found to be normal. She subsequently bore two children. In these cases we must take into consideration the older accepted forms of amenorrhea. One common class was in strong, healthy, young servant girls, particularly the Irish, who came to this country. Sometimes they had amenorrhea for a year or two. Another class were the young girls who became unusually stout as the result of defective metabolism, though the word "psychic" could not be applied to these.

DR. BULLARD (closing) said in reply to Dr. Taylor that unfortunately this patient was not examined vaginally during those years of amenorrhea. However, he noted no atrophy at the first examination made immediately after the resumption of menstruation.

Dr. Arnold Sturmdorf had told of two cases of prolonged amenorrhea, both due to terrific mental shock, one of six years' duration and the other lasting ten years. The latter resumed menstruation a few months after marrying, became pregnant the next year, and after the birth of her child continued to menstruate normally.

DR. G. L. MOENCH (by invitation) read a paper entitled **A Consideration of Some of the Aspects of Sterility.** (See page 334.)

DISCUSSION

DR. W. H. CARY said that it was very difficult to discuss a paper covering all the factors involved, although he had been particularly interested in the study of the semen for some fourteen years. He did not believe that any one now failed to understand the responsibility of the male in a childless marriage. Dr. Cary brought the subject before this Society in 1915, at which time he stated the male responsibility to be 35 per cent. He then classified and gave a nomenclature for the deformities of the sperm heads, and also discussed the minor degrees of semen deficiency. For several years now he had been classifying semen as follows: azoospermia, very poor, poor, fair, good, and excellent. If Dr. Moench has given us any method to more accurately measure the vigor of those specimens that lie in the three middle classifications, the very poor, the poor, and the fair, it is a very valuable contribution. Dr. Cary found it very difficult to determine from microscopic examination of the semen alone, the fertilizing vigor of the various types except the very poor and the excellent. Those motile specimens that are only fair, or poor, offer a very difficult problem to the consultant who is asked to condemn or confirm the male.

Dr. Cary said he must disagree with Dr. Moench as to the Hühner test. His modification of this test, which includes a systematic preparation of the patient and a standardized technic of procedure approximately one hour after coitus, has proved a most valuable step in the study of sterility, especially in these borderline cases. In these tests the patient is instructed to continue reclining one-half hour after intercourse and is also cautioned not to visit the toilet before arrival at the office. Accurate conclusions of the findings require much experience and patient study and must be interpreted in relation to the gynecologic conditions.

He also disagreed with the statement that you can tell by the appearance of the cervix the condition of the cervical mucus as a medium of sperm cell trans-

mission. He satisfied himself to the contrary on that point from a careful analysis of the data of one hundred insemination observations. One conclusion from that study was that from vision alone the density of the cervical mucus in its relation to insemination cannot be accurately ascertained. One can tell the bad endocervicitis cases with thick, purulent mucus, but there is a mucus in the canal that looks glistening and normal and when you attempt to pick it up with the pipet you cannot get sufficient suction to obtain it. A mucus of that density will not allow migration of any but the rare supervigorous semen. Dr. Cary claimed there was no more valuable test in the whole realm of sterility study than the insemination test done on a standard, systematic basis, to determine the relation of cervical secretion to sperm migration.

The doctor then discussed from his standpoint the significance of the various types of semen which were illustrated by the first slide shown by Dr. Moench. He had long emphasized that the motility of the sperm cell is not necessarily an indication of its fertility. The percentage of active cells, the rapidity of the movement and the length of time the activity of the cell continues are three practical points that any one can determine. The reason for error in determining the fertility of the semen is the lack of knowledge of what constitutes a normal semen. If you want to determine the ability of the semen you have to study it in relation to the individual case, and take the specimens both vaginally and cervically, up the cervical canal as far as the internal os. If the reader of the paper were to do his postcoital study in the manner described he would find it most valuable. The semen does not enter the cervix in the pin-hole type of cervix and Dr. Cary was inclined to think it does not travel above the point of flexion in certain types of anteflexion. The fact that the menstrual blood comes through has nothing to do with it at all. The fact is there is deficient drainage with catarrhal accumulation which acts as a block to the sperm cells.

DR. I. C. RUBIN agreed with Dr. Cary in practically all he had said in his discussion. However, there are many things that bear a different interpretation from that which was presented tonight by the reader of the paper, some because they are a little incomplete, others because the observations do not quite tally with those who have really intensively studied this particular phase of sterility, namely, the ejaculated secretion of the male. He felt quite in accord with Dr. Moench that we must now focus our attention more than ever upon the male factor as a cause of sterility; that the figures given in the literature are by no means final; that percentage of incidence is perhaps more guesswork on the part of different authors in their own limited experience. All are agreed that the male is responsible for sterility in his wife in some 30 per cent of cases; that he is also defective per se at the time of marriage in a certain additional percentage of cases; and furthermore, that those morphologic features of the spermatozoa which Dr. Moench has described tonight may be responsible for the relative infertility of the male in a particular mating, and those are things not yet settled.

Dr. Rubin agreed that we must not minimize Hühner's work, as it was the first important biologic step to give us some definite notion as to what takes place during insemination in the vagina and the cervix. He did not agree with Hühner that it is the final thing. Hühner is quite satisfied to exonerate the male from the causation of sterility when he finds living spermatozoa in the vaginal vault and especially in the cervix. That does not, however, show by any means that the matter ends there. We do not know, for example, what is a fertile semen. Motility is not the whole thing. Abundance of motile spermatozoa is only a rough indication perhaps of, let us say, the fitness of that semen, but it does not

mean that any ejaculate of the same male at different times is just as fertile at one time as at another.

As to the abnormal forms of spermatozoa, Dr. Rubin said that for practical purposes, we may consider two or three types, seen either in different planes or at different stages of their life in the ejaculated semen. Two types are most common, the one that Dr. Moench calls megalosperm, with the large round head, and the other, the smaller type designated by Dr. Cary as the microcephalic sperm, which is by far the most abundant in the condom specimen. It is also in the greatest preponderance in the vaginal secretion, and, although the large-headed spermatozoa are in the minority, these are the spermatozoa that reach the cervix. The small microcephalic spermatozoa remain in the vagina where they may be active for a while, but perish there, never reaching the cervix. It is these larger spermatozoa, with the long tails and the whip-like motion, which Dr. Rubin designated for his purposes as the "searching type," that reach the cervix.

After the semen is frozen the motility stops. The deformed types that Hühner described, with the frozen neck or disjointed neck, are very common. Dr. Rubin said he had never seen in the many hundreds of specimens of semen that he examined, any with double heads and double tails, and considered them artefacts or optical illusions. It is possible that the cytoplasm protrusions referred to by Dr. Moench and which he designated as "collarettes," give this double headed picture.

If any further work is to be done along this line, it should be done by supravital staining. He hoped Dr. Moench would take that up. Before he would speak of any particular husband as doing his share Dr. Rubin wanted to see a goodly number of those larger or maturer type of sperm in his semen present in the cervix and exhibiting good motility. Even this does not yet tell us which are the spermatozoa that are really fertile. We have no way of getting at that. Dr. Rubin did not believe that we can exonerate the male partner simply because he is able to deposit motile spermatozoa in the genital tract of his wife.

As regards what Dr. Moench said about the abnormal type of sperm cells being responsible for the relative infertility of a mating and resulting in habitual abortions we know that, as Reynolds has shown, if you increase the vitality of a given male who is relatively infertile, by whatever you prescribe, his fertility becomes heightened. Dr. Rubin saw several definite cases, where the wife aborted several times, and it was only by focusing attention upon the male and improving his health that the next pregnancy was successful and carried to term.

In regard to the female ovum, we are getting some gleam of hope in determining fertility in the woman. What with the sex hormones that are beginning to be developed and standardized on the one hand, and the physiologic researches, particularly of the Carnegie Institute of Embryology, on the effect of ovarian activity upon uterine and tubal physiology on the other hand, it is hoped perhaps the time is not too far distant when we shall be able to test the presence of and the degree of ovarian activity. In determining tubal peristalsis with carbon dioxide insufflation of the uterus at the same time that we test for patency we may be able to find out how the ovaries are functioning. Dr. Rubin believed that within a short time we shall be able to say something about ovarian activity and, perhaps, the ovum itself without depending alone upon the menstrual history, etc., as we were formerly compelled to do. Also in addition to the study of the vaginal flora and the vaginal secretions as found during all phases of the menstrual cycle, the glycogen content and so on, we shall really have an index of ovarian activity even as far down as the ovum itself.

DR. R. L. DICKINSON claimed that if we obtain a mathematical measure of the efficacy of semen we will have stepped far forward in the most neglected section

of our work, and he urged thorough investigation of a large number of males by this counting and measurement.

Dr. Rubin made a valuable suggestion, namely, that of "behaviorism" of the cell as a test. What type of cell is it that goes into the cervix, he asks. And if he says it is the busiest and most inquisitive, then we have all noted this type which Dr. Dickinson dubbed the "hunting dog" cell, the one that keeps relentlessly searching out its prey on the microscopic field. If that is the type that gets into the cervix, we can then have another test for good semen.

Dr. Dickinson referred to the fact that the genitourinary men had failed to carry on an intensive study of the semen, with the exception of one or two, and that consequently, the gynecologist was the man to continue the work. He said, further, that Frank R. Lillie of Chicago, who has written a book on this subject, "Problems of Fertilization," had stated that it is necessary to know more about the age of the cell, and that some of the active spermatic cells may be relatively old.

The doctor then discussed the possibility of sterility being caused by absorption into the blood in the case of prostitutes and in the case of married women who have intercourse daily or oftener. He had recently asked Dr. Katharine B. Davis to look over the 10 per cent of her schedule of 1000 married women who cohabited daily or oftener, to see whether they showed relative sterility, and that she had reported there was no evidence in her lists that frequent intercourse made women sterile. There were ten patients who have been married ten to thirty years, with daily or nearly daily intercourse who have had from two to eight children; so here are some examples of semen that have not been thinned out and rendered imperfect by frequent intercourse and women with whom no absorption inhibition occurs.

DR. HAROLD BAILEY said that two related subjects are brought immediately before us. First, in regard to antenatal pathology, efforts might be made to determine the proportionate number of abnormal forms in syphilitic and in alcoholic men as compared with the normal, and along these lines we might find something of great interest. Secondly here is the first intimation that abortions may be a conservative act on the part of Nature. We know that 250 or thereabouts of every 1,000 conceptions end in abortion. At one hospital seven abnormal infants were born in 1100 cases. If this is so, it is questionable whether we ought to be so determined to save the ovum in threatened abortions until we know something more about the pathology of the semen.

DR. MOENCH, in closing, said that he wanted to assure Drs. Cary and Rubin that he examined these specimens in the fresh state as well as stained. If, however, one examines the semen only in the fresh state it is impossible to get sufficient magnification to see the finer details of the spermatozoa. In fresh specimens one may recognize arrested development, microsperms and megalosperms, even cytoplasmic extrusions, but the finer nuclear and body changes escape detection. They can only be made apparent with a good stain.

The abnormal forms shown in Fig. 1 are positively not imaginary, nor are they artefacts. In one particular case Dr. Williams counted 213 abnormal spermia among 1,000 where Dr. Moench had counted 231. At the same time he did not claim to be sufficiently well versed in the minor abnormalities of the sperm cells to be able really to recognize and classify all of them and frequently found difficulty in fixing the picture of the normal sperm cell firmly enough in his mind's eye to distinguish minor changes in a particular cell.

Dr. Moench did not agree with Dr. Rubin that most of the cells of an ejaculate are microsperms and that the large spermatozoon achieves impregnation. He felt confident that normally fertile men will show little variation in the size of the sperm heads.

Dr. Moench said he was well aware of the fact that a sperm cell seen from the side is narrower than when seen on the flat. There is no perforatorium in the human sperm but there is a definitely concave point to the cell. All the cells shown were seen on the flat. The double forms were focused on very carefully. One specimen had about 2 per cent double forms and certainly one would not count as many as 20 in 1,000 in one specimen whereas in other specimens one only very rarely saw a double form or perhaps even none at all. The tailless forms, or the tailless heads, do not mean anything unless the head itself is abnormal and we find these tailless forms in cases where there is a lack of division of the anterior end knob in contradistinction to the normal cell in which they are more developed and give a more or less square or rounded base to the cell.

The whole paper as stated is only a preliminary report. It will need hundreds of cases to establish the limits of normal variation. Dr. Moench felt that he did not bring out sufficiently the fact that all the semen specimens reported on showed numerous actively motile spermia and seemed all right on routine examination. It was only when one studied the finer details that the marked difference between good and bad semen examples was evident. It is undoubtedly true, as Drs. Cary and Rubin said, that the sperm depicted belonged in some instances to different stages of development but this in itself is important. Williams and Savage have shown that a bull emitting even as low as 1 per cent immature spermia is inferior as a breeding animal. These investigators have got so far in their investigations that they are definitely able to determine a bull's fertility from the character of the sperm cells, and in a number of instances, where a herd owner refused at first to accept their diagnosis based on measurements and graphs of the sperm heads, a few months were enough to show that they were right. Dr. Moench believes therefore, that if we work up this subject in the human male we are going to arrive not simply at a stage where we can say of the semen specimen "this is good" or "this is bad," but at a point where we will be able to state mathematically "this semen is normal," "this is so far from normal," "this is rather questionable," or "this is absolutely poor."

Dr. Moench said he had not had sufficient experience as yet to be able to even guess what the coefficient of variation or the standard deviation or average mean is going to be, nor could he say what the optimum semen or the optimum graph in man is going to look like, but claimed that the variations in the cases of the human male are high as compared to the bull. But it requires hundreds, probably thousands, of cases to establish anything definite.

Dr. Moench agreed with Dr. Aldridge that the so-called biologic incompatibility will, as we gain further knowledge, be shown not to be an incompatibility at all. At present we simply do not know enough about the problem to tell what is the basis of the sterility in these cases.

As to the Hühner test, Dr. Moench persisted in disagreeing with Dr. Cary. He did not say the test was valueless but that it was misleading. After all, however, this is simply a matter of a difference of opinion and it seems that the only thing to do is to find out why such a difference of opinion should exist. He could only say that he had found nonmotile spermia in compatibility tests done on fertile women and motile spermia in the cervix of women who had no pathologic findings but had never conceived. Sometimes nonmotile spermia, when placed on the slide in warm normal saline solution, would become active. Dr. Moench was unable to offer definite reasons for this phenomenon. In the case D (which had the very poor sperm head graph) the spermatozoa were actively motile and the compatibility test normal but stained smears showed up the inferior quality of the semen, that is, the variations in the size of the sperm heads and the percentage of abnormal forms were far too large.

BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF MAY 7, 1926

DR. C. G. NORRIS of Philadelphia read by invitation a paper entitled **Factors Influencing End-Results in Carcinoma of the Cervix After Irradiation.** (For original article see page 279.)

DISCUSSION

DR. C. A. GORDON said he was of the impression that as people grew older, the virulence of the cancer grew less, and he wondered whether possibly some of the patients in the older age groups died from some other condition, thus making the statistics even a little better than shown in the table.

Dr. Gordon believed that surgery for cancer of the cervix is a thing of the past, but that we should not use radium, or x-ray either, for any localized cancerous growth unless we know something of the histologic character of the cancer in question.

DR. S. A. WOLFE said that in the present stage of treatment of carcinoma of the cervix, the pathologist has only a limited idea of the disease because only biopsy material is offered for examination. In reviewing a number of uteri that had been removed by radical hysterectomy some years ago, however, carcinoma of cervix was seen to present three different gross types which influence the time of onset of symptoms and the rapidity of extension into the broad ligaments in the course of the disease.

In the first group are the familiar cauliflower types of carcinoma, or the everting form. These grow on the surface of the cervix and extend directly into the vaginal tube. Growth into the cervix, or into the broad ligament, occurs late. Implantation into the vagina, however, is of frequent occurrence. Dr. Wolfe believed that the onset of symptoms in this particular group will be relatively early, because this carcinoma is in the vagina and subject to infection. Secondary ulceration follows with the appearance of "dish-water" discharge, indicating necrosis of the tumor. This occurs before broad ligament extension or lymphatic involvement is marked.

The second type of carcinoma is the so-called endocervical or infiltrating carcinoma. The portio is relatively uninvolved, as the bulk of the carcinoma is higher in the cervix. Symptoms do not appear in this group until necrosis and ulceration have taken place. Long before, however, extension into the broad ligament and lymphatic metastases have occurred. Yet the duration of the symptoms in this gross form of the disease is relatively short.

The third form of carcinoma of the cervix, which he arbitrarily called the infiltrating type (of course, pathologically, all these forms are infiltrating), is one which begins in the portio or near the external os and grows inwardly, destroying the cervix in its course of development. This group, occupies an intermediate position from the standpoint of the rapidity, onset of symptoms and extension into the broad ligament.

Histologically we have classified cervical carcinoma for the past two years. Four types are recognized.

The first type, which is least malignant, is the old-fashioned squamous carcinoma, which produces prickle cells and keratin pearls.

The next most mature is the adenocarcinoma. Embryologically, of course, adenocarcinoma and squamous cell carcinoma come from the same müllerian tissue.

In Group 3 the transitional epidermoid cell is prominent. The prickle cell is replaced by a round or polyhedral cell with reduced cytoplasm and a more prominent nucleus.

In the fourth group the predominant cell is the fat spindle or basal cell first so designated by Martzloff. The cell has scant cytoplasm and is almost wholly filled with a large prominent oval nucleus, rich in chromatin.

Pure forms are seldom seen. Even the adenocarcinoma show solid aloveoli simulating epidermoid epithelium where growth has been extensive. Group 3 not infrequently shows a wide zone of Group 4 carcinoma.

With the prognosis based on the histologic pictures presented by a small section of the tumor obtained by biopsy, only a relative idea is obtained of the predominant cell type in many of the carcinoma.

The gross form of the disease should, therefore, be correlated with the microscopic picture and comparison of histologic malignancy should be made only in tumors of the same gross type. A Group 3 carcinoma of the cauliflower type very likely offers a better prognosis than a Group 1 cancer of the infiltrating or ulcerating type where the tumor has run its natural course before the onset of clinical symptoms.

In conclusion, the following factors must be correlated in prognosticating cervical cancer: the gross form, the histologic character, the local extension and the duration of the clinical symptoms.

DR. W. S. SMITH commented upon the amount of radium placed in the uterus, as shown in the slide where the radium was in one position, whereas the rest of the uterus showed no evidence of radiation whatsoever. He believed it better to use at least two tubes in order to spread it out over a greater area of the uterus, and possibly it would be wiser to even use three tubes so as to cover the entire length of the uterus, because the radium is apt to slide down.

Dr. Smith also emphasized the use of the cautery plus radium. In a small number of cases, the women who have been subjected to cautery and high amputation of the cervix plus radiation at the same time have done very much better than those in whom the radium was used alone.

DR. W. A. JEWETT said that those who look at this question from a clinical standpoint have in years past felt that the statistics were rather unsatisfactory because of the different starting point of the reporters. The work that has been done in Philadelphia demonstrates the newer method of handling the situation in typing the cases clinically so that the pathologist in his report and the clinician in his work can have a proper clinical picture of the exact type of disease with which he is dealing.

DR. NORRIS (closing) said this work was only in the nature of a preliminary report.

Dr. Wolfe brought out a very definite point. In the first place, if you are going to try to make any classification from groups, you have to be able to group them. In other words, is it possible with a primary factor to group cervical carcinoma in any more definite groups than adenocarcinoma and epidermal? Dr. Norris did not altogether agree with Dr. Wolfe. It seemed to him this was possible, but that is an individual opinion which time may alter.

It also seemed to him in contradistinction to what Dr. Wolfe said, that these tumors do not alter their condition other than as the result of local changes. In other words, where you see a transitional cell type in one part you see a transitional cell type in other parts. If you cannot classify them, you may just

as well say: "They are all malignant, treat them all the same; there is no prognostic value about it," and we know clinically there is a difference; there is a difference in response, but whether that is a chemical proposition in the blood or something foreign to us is a question. Dr. Norris does not believe we can answer that until the cause of cancer is known.

In regard to the question of age: Dr. Norris believed that the younger the tumor the more malignant it is prone to be. Cervical cancers occurring in young individuals generally seem to be more rapid in their growth and cause earlier metastases than in older individuals.

The important thing about the study of cancer is the question of classification, including the extent of the disease and the method of reporting statistics. The vital point in any series of cancer statistics is—how many total five-year cases have you seen? How many of those cases are alive?

Then there should be a uniform method of dealing with lost or untraced cases, and there should be some uniform method of grouping cases, because when a patient first comes and asks "What are my chances?" it is only a plain business proposition that one should be able to say to her or to her family (of course, they are the ones you ought to tell, and not the patient), "You have a one to three chance, you have a three to one chance, or you have a 20 per cent chance," or whatever the figure may be. In fact, the American College of Surgeons has a classification, which is practically identical with that used by Dr. Norris.

In the cases reported he did not take up treatment in detail because the paper was not on treatment. They were all treated practically with a uniform dosage of the element, 2400 milligram hours, 100 milligrams for twenty-four hours. That has been the standard dosage, beginning with three of the doses about three weeks apart. Too many vesicovaginal fistulas occurred and they got the idea that they were getting most of the results from the first treatment, so for a time they gave only one treatment, and these statistics are based almost entirely on one treatment. Only the advanced cases were treated by radium. The earlier ones were treated by operation.

Dr. Norris is now treating with 2400 milligrams of radium and keeping the cases under careful observation, noting the response, and in many cases are giving a second treatment, and sometimes a third treatment, according to the response to irradiation.

As to the method of applying the radium, it must be in the canal. Second treatments are given by needles, sometimes raying in the broad ligaments, or whatever the case may require.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

New Books

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S., NEW YORK CITY

THE PHYSICIAN AS AN INDIVIDUAL

I shall start my review with four books dealing not only with the work of physicians but with the physician as a human being. Some of this material is biographical, some imaginary, and in one of the volumes, biography and imagination have been freely mingled. What is most apparent after having read these four books, is the clear-cut record of his own personality which the biographer reflects in his writings. This would signify that it is almost impossible to focus a true light on an individual unless the author is unusually objective, this resulting, as a rule, in a dry colorless biography, or that the person write his own autobiography in which case the reflection of his personality in his writings will only add to the truth of the concept that we can form.

The first book deals with Sir James Mackenzie whom his Lancashire patients called "the beloved physician"[1] on account of his kindness and sympathy. Born of humble parents in Scotland, brought up under mediocre conditions, considering himself a dunce, and revolting against the huge prestige which memory enjoyed in contradistinction to reason, in the schools of those days, Mackenzie grew up to hate the academic system which did not teach the student how to study. Athletic and good at games, shy and overdiffident, his engaging personality nevertheless singled him out for residency at the Edinburgh Royal Infirmary, and early in his career he was invited to join a flourishing firm of practitioners at Burnley. Thus everything pointed to Mackenzie's remaining a humdrum general practitioner. The tragic death of a young woman at childbirth, from heart failure, the fact that he was unable to make a diagnosis or give a verdict to patients who complained of cardiac pain, first directed Mackenzie's investigations to the study of heart disease. The first important observation was that the arrhythmia due to missed beats or as he called it, the "irregularity of the youthful type," involved no danger. From then on came discovery after discovery which finally placed Mackenzie in the forefront of cardiac investigators. The entire book is written in a most sympathetic and charming way; if anything, it is a little more saccharin than the robust and manful personality of Mackenzie warrants.

[1] **The Beloved Physician.** Sir James Mackenzie. By R. Macnair Wilson. The Macmillan Co., New York, 1926.

No such accusation can be made against the author of the second volume to be discussed in which De Kruif[2] has taken keen pleasure in overemphasizing the foibles of men whose names are indelibly connected with real and often wonderful achievements, in a fashion which resembles the "smart Alec" attitude of the school boy who tries to magnify himself by pointing with the finger of derision to the feebleness of his teachers.

Paul de Kruif has presented the high lights of bacteriology in fascinating, popular, newspaper language, emphasizing two points, one, the romance of the quest, and two, the fact that "The gods are frankly human, sharing in the weaknesses of mankind, yet not untouched with a halo of divine Romance" (E. H. Blakeney). Although I confess that I was fascinated by the book, many of its passages aroused keen indignation because the author appears to distort facts to suit his purposes and, to my mind, totally misinterprets the character of his dramatis personae. Recently Bruce and other members of the Sleeping Sickness Commission, in a letter addressed to the editor of the *Journal of the American Medical Association*, sharply called the author to task for misstatements in the book. I feel sure that those so inclined could point out a number of other mistakes that have crept in. I would be willing to forgive many inaccuracies were not the second fault of the author, his unkindness toward investigators, his constant emphasis of their being "muddlers," his stressing of their human weaknesses to an unkind degree, his harping upon the fact that practically all of these investigators had to feel their way, made mistakes and errors which in the light of further knowledge now appear puerile. This warped attitude has spoiled the pleasure with which I would otherwise have perused the book. To a laboratory worker, and De Kruif I understand was such a one, it should be plainly apparent that the only way to pursue the hunt for enlightenment, is by unprejudiced, planned groping. Perhaps De Kruif, and I say this without knowing his work or record, may be of the type of workers who makes a hypothesis, upon it builds a theory, and then tries to find the facts which will prove it, to my mind a method to be distinctly discouraged.

I am particularly sorry that the public at large, because this book has a tremendous sale, should be given such false impression of Pasteur, the founder of modern medicine, bacteriology, surgery, etc., the man who, handicapped by a paralysis in his early manhood days, conducted under most discouraging circumstances and inadequate equipment, his search for truth and enlightenment, and found cures for some of the worst diseases with which mankind is afflicted, persisting until death finally overtook him. I deplore that the public should see emphasized the human weakness of men like Metchnikof and Ehrlich, one-sided individuals, but tireless workers and discoverers.

I hope that the good contained in this book will overshadow the bad, and that the lay public will be lured by the author's striking exposition to pursue their awakened interests in more critical, if less attractive, volumes.

The third volume *The Practical Surgery of the Joseph Price Hospital* written by Kennedy[3] is to all intents and purposes a memorial to Joseph

[2] **Microbe Hunters.** By Paul de Kruif. Harcourt, Brace & Co., New York, 1926.

[3] **Practical Surgery of the Joseph Price Hospital.** By James Wm. Kennedy, M.D., F. A. Davis Co., Philadelphia, 1926.

Price himself. With laudable loyalty Kennedy records the dexterity, simplicity, and thoroughness with which he says the surgery of Joseph Price was associated in the minds of those who knew him. He disclaims having looked up the literature before starting on his book and any one reading through this volume will agree with him. Kennedy says that Price was often spoken of "as the American Tait" and that he always made a plea for early work followed by radical toilets and removal of the distal infecting source. The subjects of most interest, from our point of view, that are covered, are vaginal hysterectomy, ectopic gestation, repair of the cervix, perineum, and cystocele, tubal and ovarian infection, puerperal infection, tuberculous peritonitis, and drainage in abdominal surgery. Many other lesions and technics are discussed.

According to the recorder, in 85 per cent of those cases in which it is indicated, vaginal hysterectomy can be done in from two to three minutes by means of the clamp technic. In 98 per cent of operable malignancy of the uterus, this operation has been performed. This includes malignancy of the cervix. The same operation is recommended for prolapse of the uterus, hyperplastic uterus, and with "abused cervix." No attempt to lay down indications for the operation, no mention of the change in indications since the introduction of the x-ray and radium in gynecology, no statistics of any kind are forthcoming.

The pigeon-holing of one operator as a "toilet operator" and the other as a "physiological surgeon" while descriptive and perhaps original, strikes me as neither scientific nor elegant.

That Dr. Price "in many cases," said that "one should make the diagnosis of ectopic from the peculiar mental attitude of the patient which was often indicated by her facial expression," bespeaks an acumen and flair as well as imaginativeness which, I confess, the fewest of us have been endowed with, nor do I think that any serious student of sex physiology will accord serious consideration to Dr. Price's opinion that there is greater likelihood of ectopic gestation following rape or illicit intercourse. Presumably Dr. Kennedy means "Hegar" when he regularly speaks of the "Hager" operation. I cannot see that anything new has been contributed to the technic of cystocele or repair of the perineum or anything which makes it worth while recording.

What Kennedy says about the danger of curettage is to be endorsed in every way, and is being endorsed by every modern teacher who tries, I will confess, as a rule in vain, to teach his students not to tamper with the interior of the uterus, especially if infection is suspected and to impress them with the fact that the curette was reinvented by Ruge as a diagnostic instrument solely. Apparently early and radical intervention in tubal infections was the practice of Price, as soon as pus was suspected, which included, according to his biographer, close to 95 per cent of all the patients who had tubal and ovarian infection. While some *surgeons* who practice gynecology will agree with this viewpoint, a majority of *gynecologists* who have tided patient after patient to the asymptomatic stage will not believe such radicalism justified. This applies especially to those of us who twice within the last thirty years, have been almost swamped by waves of radicalism in treating pelvic infections, only again to see common sense and conservatism gain the upper hand. Price and his pupil are correct in saying that after entering the abdomen for inflammatory disease, radical removal of "a mountain of pathology," if such journalistic jargon is to be used in serious writing,

is preferable to what he probably would call "tinkering technic" but such intervention may be indicated in 25 per cent, not 95 per cent. The discussion of puerperal infection is so involved that I am unable to form any idea of the method of diagnosis or the form of treatment recommended.

The space for review prevents my giving this book as full a discussion as I should like to. From it I gather that Joseph Price was a forceful, original man, a tremendous driving force who inspired either friendship or enmity. This very personal book may keep his memory green in the hearts of his friends. It is unfortunate that the one-sided, unscientific, combative method of presentation selected by the biographer can only serve to increase the prejudice against Price's over-radical teachings. The book records many technics which are simple and direct, and which, doubtless, Price in many instances worked out for himself, but which other operators years ago developed and many of which they have abandoned for better procedures.

The final book to be discussed under the heading of "The Doctor as an Individual" is a French medical novel translated by Joseph Collins.[4] Here the medical profession is held up to the lay public for dissection and largely for contempt. The novel itself is most mediocre, the characters overdrawn both as to their good and bad qualities, and the moral to be drawn is so melodramatic and improbable, as to fail in carrying conviction. The translation is smooth.

GYNECOLOGY

The third edition of Veit's Handbuch der Gynäkologie[5] is appearing under the direction of Stoeckel. The first to be put into print is the second volume. A great majority of the authors appear to be new, although some of the old guard, such as v. Franqué, Kehrer, Menge, Meyer, Opitz, Pankow, Sellheim, Tandler and Walthard represent the transition from Veit's immediate contemporaries to the younger generation.

The second volume contains a 350 page description of the female hygiene by Hugo Sellheim who has written on similar subjects in a large monograph of his own as well as in the Halban and Seitz *Biology and Pathology of Women*, and in Döderlein's *Handbuch*. Sellheim handles this somewhat large and diffuse subject in a very clear cut and understandable fashion. It is true that the actual instructions to be given to the growing child, the nubile young woman or the bereaved widow are somewhat vague, but those who are interested in finding more detailed discussion of a given topic have the modern German literature pointed out to them by the author. The life of the female child is taken in hand from the time of birth through the ages of prepuberty, puberty, marriage, and gestation. The adaptation of woman to education, society, and occupations is discussed. Much space is devoted to the trends of women's dress, the influence of fashion and fads upon the female form, and similar questions. The illustrations show the careful selection and artistry of the author to a striking degree.

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[4] **Our Doctors.** By Maurice Duplay. Translation and preface by Dr. Joseph Collins, New York, Harper & Brothers, 1926.

[5] **Handbuch der Gynaekologie.** By J. Veit. Ed. 3 edited by Prof. Dr. W. Stoeckel. Second Volume. J. F. Bergmann, München, 1926.

Meisenheimer, in a shorter article, discusses the laws of inheritance, first in animals and then the direct application of Mendel's and other theories to the human being. Such subjects as inheritability of normal habitus, of diseases, and malformations are thoroughly illustrated. Determination of sex is fully discussed. I am glad to say that this volume is completed by an author and subject index which is so painfully missed in the Halban and Seitz publication.

It is to be hoped that Stoeckel will be able to produce as useful and authoritative a handbook as his predecessor, Veit, succeeded in editing. Unless he takes great care in obliging his collaborators to study and utilize the world's literature, instead of confining their articles to German sources, the new edition will never attain the worldwide popularity that previous editions enjoyed, particularly among the older generation of gynecologists and obstetricians who still believe that the science of medicine knows no political or racial boundaries.

And still they come.[6] Since my last review in July, five installments of Halban and Seitz's *Biologie und Pathologie des Weibes* have arrived. The mass of material dealt with in this series, as well as the tremendous range of subjects, is amazing. It is really impossible in the form of a review, to give more than a catalog of the subjects.

Installment 25 contains "abnormal length of pregnancy" by L. Nürnberger. He deals with both the too short and too protracted condition. Abortion and premature labor have been divided between Nürnberger who treats of the anatomy, and Heynemann who discusses the clinical aspects.

Installment 26. In this, Krukenberg describes the anatomy and mechanics of the pelvis, while E. Martin discusses the contracted pelvis. Martius has covered both abnormal presentations and the abnormal size of the child, as well as fetal malformations of import to the obstetrician.

Installment 27 contains the relationship between skin and the pelvic organs by J. Novak, illustrated with some excellent colored figures of skin diseases, a most important contribution to the subject. The same author deals with the relation of infectious diseases to normal and diseased conditions of the female genitalia, while Weinberger describes the relationship between the organs of respiration and the female genitalia.

In installment 28 the same author concludes this theme. Schur has the subject of metabolism and gynecology. E. Schwarz describes the important relation of the adrenals to the sex organs as well as that of the spleen and pancreas.

The last installment to be received, 29, contains Seitz's contribution on toxicosis and dyserasia of pregnancy, while Essen-Möller writes on eclampsia and eclampsism.

The work, as mentioned at the outset, is assuming colossal proportions. I reiterate that its entire success will depend upon a detailed and most minute index of both authors and contents, with careful, cross indexing to make ready reference easy. Without this, the average reader will decline to search for a given subject in the thousands of pages covered.

The sixth edition of the standard textbook by Crossen, on *Diseases of Women*[7] has appeared. As in the previous edition, the chapter on inter-

[6] **Biologie und Pathologie des Weibes.** Edited by Josef Halban and Ludwig Seitz. Urban und Schwarzenberg, Wien, 1926. Installment 29.

[7] **Diseases of Women.** By Harry Sturgeon Crossen, M.D., ed. 6, The C. V. Mosby Co., St. Louis, 1926.

nal secretory glands is written by Hugo Ehrenfest. Not many changes were necessary as the book was fully up to date. This textbook together with Crossen's *Operative Gynecology* has gained an enviable place in American gynecologic literature because of its completeness, clearness, and ease of reference.

The chapters dealing with General Technic, of Bumm's *Operative Gynäkologie*[8] were completed by the author before his death. The second half on Special Operative Gynecology shortly will appear under the direction of Warnekros, completed from the voluminous notes and sketches left by the deceased master. The first portion now at hand corresponds in many ways with the well-known lectures on obstetrics, published years ago by Bumm, which, to me, have always seemed one of the most masterly expositions of midwifery. Bumm apparently tried all the newer methods of intraperitoneal antisepsis and returned to the well-established technic of drainage or extraperitonealization. He devotes considerable space to local conduction as well as to sacral anesthesia. In his opinion both ether and chloroform have their indications, as well as acetylene (narycelene). All the details of preparation, a description of his simple operating table and source of illumination are entered into. Excellent anatomic pictures of all the methods of vaginal approach are given, with a clearness and simplicity which we have learned to expect from his book on obstetrics. The same applies to the carefully illustrated technic of laparotomy. The method of closing the hernia of the umbilical cord in the newborn is shown, as well as the sacral approach to the pelvic cavity and the transthoracic operation for emboli devised by Trendelenburg.

Segond[9] has given a small anatomic atlas of the gross innervation of the genital organs of the female, based largely upon the dissection made by Hovelacque. He believes that resection of the nerves, especially of those coming from the superior hypogastric plexus, should cure "ovarian pain" and dysmenorrhea as well as similar functional disturbances. No mention of Harris' ineffective and discarded operation for resection of pelvic nerves is made.

OBSTETRICS

With his accustomed diligence and thoroughness, Vignes, together with Dauphin, has started an obstetrical year book called *L'Année Obstétricale*[10] covering the works of 1924. In his introduction, Vignes says one of the greatest annoyances to the true worker is to find out that his scientific achievements are disregarded by the workers of other countries. This disregard is sometimes due to "méfiance," or a false idea of patriotism, with the consequent placing of obstacles to the progress and knowledge of medicine. A tremendous number of subjects are covered, which it would be futile to attempt to give in the form of a review, as the book itself is an epitome. The introductory chapters deal with the burning questions of the day, such as the causes and nature of the toxemia of pregnancy, the effect of the radiation on reproduction, and sim-

[8]**Operative Gynaekologie.** I. By Ernst Bumm. Allgemeiner Teil mit 159 Abbildungen. J. F. Bergmann, München, 1926.

[9]**Innervation des Organes Genitaux de la Femme. Deductions Chirurgicales.** By Dr. Robert Segond. Gaston Doin et Cie, Paris, 1926.

[10]**L'Annee Obstetricale (Travaux de 1924).** By H. Vignes and J. Dauphin, Masson et Cie, Paris, 1926.

ilar queries. The book shows very careful editing and compression. It will prove of use to every obstetrician. Let us hope that Vignes and his collaborator will each year continue this most useful and important task.

Comparing the old fourth edition of Edgar's *Practice of Obstetrics* with the new sixth edition[11] revised by Vaux, it becomes apparent that the book has gained instead of lost by being deleted of 300 pages. The new edition is on much better paper, which has brought out the illustrations to a wonderful degree. It contains all the good of the older text, which made Edgar's book such a popular one, and it has been brought well up to date in most respects. We would suggest that in the next revision the number of variations of deciduitis be reduced from seven to one, and that the pathology of chorionepithelioma be rewritten to conform to the modern view, that the division into chorioadenoma and choriocarcinoma is not warranted, and that furthermore, in describing the treatment of eclampsia, much greater stress should be placed on the Stroganoff method than on the rapid emptying of the uterus, which, in our opinion, is being less and less used by conservative obstetricians who realize the nature of eclamptic toxemia though still ignorant of its cause.

The second edition of de Moraes' book[12] is rather large and complete for a propedeutic. The author has quoted a tremendous amount of literature without giving the actual references. He dilates considerably on associated topics such as the general body form, endocrinology, and biologic tests for pregnancy. He believes that the interstitial cells of the ovary are important, on the other hand entirely neglecting to mention the newer knowledge which the discovery of potency of follicle fluid has thrown upon the ovarian function. He has collected sixteen biologic tests for pregnancy but naturally realizes their shortcomings. The book should appeal rather to the advanced than to the junior student because of its broad generalizations.

Under the title of *Clinica Obstétrica*[13] the fourth edition of Liepmann's well-known *Das Geburtshilfliche Seminar* has appeared in an excellent Spanish translation with all the text and beautiful illustrations of the German original. Montobbio showed good judgment in selecting such an unusually instructive work for translation.

Aids to Obstetrics[14] has reached its ninth edition. This pocket-sized manual evidently has some appeal. It has the faults as well as the few virtues which are necessarily inherent in this type of compend.

The dean of German gynecologists, Winter,[15] has written a most useful pamphlet for practicing physicians on the induction of abortion, its indication, methods, and legal standing. The book shows Winter's usual thoroughness. He says the purpose is "not one unnecessary abortion and not the omission of a single necessary one." In the German clinics the demand of patients for the induction of abortion is justified in from 25 to 42 per cent only. The subjects discussed include the toxicosis of pregnancy, diseases of the ovum, diseases of internal organs, of the brain

[11] **Practice of Obstetrics. For Students and Practitioners of Medicine.** By J. Clifton Edgar, Ed. 6, P. Blakiston's Son & Co., Philadelphia.

[12] **Propedeutica Obstetrica.** By Arnaldo de Moraes, Ed. 2, Graphica Sauer, de Fred. H. Sauer, Rio de Janeiro, 1926.

[13] **Clinica Obstetrica.** By Dr. Guillermo Liepmann, Ed. 4, translated by Dr. Victor Conill Y. Montobbio, Barcelona, Salvat Editores, 1926.

[14] **Aids to Obstetrics.** By Samuel Nall, revised by C. J. Nepean Longridge, Ed. 9, William Wood & Co., New York, 1925.

[15] **Der Kuenstliche Abort. Indikationen, Methoden, Rechtspflege fuer den Geburtshilflichen Praktiker.** By Prof. Dr. G. Winter, Stuttgart, Ferdinand Enke, 1926.

and its appendages, diseases of the special senses, as well as social and eugenic indications. Throughout the author assumes the most conservative but openminded position. His stand on tuberculosis appears to me a trifle too rigid as he regularly declines to induce abortion in all latent forms although he acknowledges that a change for the worse may be expected in up to 20 per cent. He naturally agrees that in the presence of any activity pregnancy should be cut short. Among the eugenic indications, all hereditary diseases may indicate interruption. Among these he includes dementia precox, idiocy and severe epilepsy, hereditary ataxias, spastic spinal paralysis and choreic troubles. Retinitis pigmentosa is also included. Pregnancy resulting from rape may not be interrupted. The concluding chapter deals with the German law. The book is most useful and I suggest its translation into the English language.

V. Pehan and Katz have devoted their monograph[16] to the instrumental perforation of the pregnant uterus as well as to the methods of avoiding this unfortunate and serious accident. The material is based largely on the cases seen at the Medico-Legal Institute of Haberda and perforation was found due, in the greatest number of instances, to the intrauterine treatment of incomplete abortion. A hundred cases have been used for the brochure occurring between 1906 and 1925. Eighty-six cases came to autopsy. By far the greatest number occurred after attempts at criminal abortion. He leaves the question open whether the instruments used or the man behind the gun are the chief cause of fatalities. The concluding one hundred pages of the two hundred page monograph are occupied by detailed histories of the one hundred cases, and fairly complete reference to the German literature.

The short monograph by Benda[17] on the effect of pregnancy upon the reticuloendothelial system should prove of use to those interested in this phase of gestation. He concludes that in the second half of pregnancy the permeability of the capillary walls are much increased and that the maximal permeability is found in the pregnancy toxicosis, especially in eclampsia.

KIDNEY; INTESTINE

Examination of the Urinary Tract by Carlo Colombino[18] is a practical manual of cystoscopy, profusely illustrated, thirty of the cystoscopic pictures being in colors. This book is limited to the female and is meant especially for gynecologists and obstetricians. The usual methods of examination, including pyelography, are adequately described. The newer chemical methods of investigation are not featured. The book appears to be an excellent practical manual.

Judging by the many books on the lower bowel and proctology that have appeared in quick succession, the subject must have a wide appeal. The second edition of Hill's manual[19] contains a short exposition of the

[16] **Die Instrumentelle Perforation des Graviden Uterus und Ihre Verhuetung.** By Prof. H. v. Peham and Privatdozent H. Katz. Wien, Julius Springer, 1926.

[17] **Das reticulo-endotheliale System in der Schwangerschaft.** By Dr. Robert Benda, Wien, Urban und Schwarzenberg, 1927.

[18] **L'Esplorazione Della Vie Urinarie. Nella Practica Ostetrico-Ginecologica.** Dott. Carlo Colombino, Milano, L. F. Cogliati, 1926.

[19] **A Manual of Proctology.** By T. Chittenden Hill, M.D., Ed. 2, Lea & Febiger, Philadelphia and New York, 1926.

subject. The concluding chapter is on the radical operation of cancer of the rectum written by Robert C. Coffey, which appeared in *Surgery, Gynecology and Obstetrics* in 1924.

EMBRYOLOGY; GENETICS, ETC.

Evolution and Genetics by Morgan[20] is almost a second edition of his *A Critique of the Theory of Evolution* published ten years ago, although the last two lectures dealing with the "noninheritance of acquired characters," and "a criticism of evidence of human inheritance" are distinctly new. The clear cut yet simple handling of these vastly interesting problems is a joy to any reader. Of particular interest to the medical reader is the inheritance of malformations, especially the preservation and opportunity to marry of individuals transmitting recessive characters. This is what causes the spread of such abnormalities. The transmission of color blindness, albinism, night blindness, hemophilia, and the transmissibility of blood groups, interests the medical man. Morgan concludes his book by saying that the geneticist finds it impossible to discover, with any reasonable certainty, the genetic basis of behavior, and emphasizes that in contrasting "groups" material advantages and disadvantages resulting from many causes must be taken into consideration. He says, "A little good will might seem more fitting in treating these complicated questions than the attitude adopted by some of the modern race-propagandists."

The *Textbook of Embryology* by Jordan and Kindred[21] is well compiled, clear cut and detailed, bespeaking much familiarity with teaching. The illustrations are culled from many sources to which in every instance due credit is given, and they are selected with good judgment. On the whole, this book is most acceptable. I notice, with some surprise, that Allen's theory of the cyclical formation of the ova in the mouse is accepted without reservation and that Schochet's fanciful hypothesis that follicle rupture occurs from enzymatic action is likewise conceded.

The authors show good judgment in enlivening their somewhat dry subject by incorporating the biological applications of embryology in the text, for instance, the interesting speculation on the continuity of germ plasm, the problems having to do with the determination of sex, sex reversal, bisexual potentiality as the effect of environment, and the recapitulation theory as it affects embryologic research.

The concluding portion of the book contains a short laboratory guide with illustrations of much matter dealt with in the laboratory exercises. Altogether this book is a distinctly acceptable textbook for both student and practitioner.

A small booklet entitled *Birth Control and the State*[22] appeared in part in the Saturday Review. Blacker has written both a plea and a forecast. He describes the political, the religious and ethical opposition to birth control propaganda and likewise emphasizes the fear of some who dread the possibility of promiscuity following the general popularization of such teaching. He then draws the conclusion that the late war

[20] **Evolution and Genetics.** By T. H. Morgan, Princeton University Press, Princeton, 1925.

[21] **A Textbook of Embryology.** By H. E. Jordan and J. E. Kindred, New York, D. Appleton & Co., 1926.

[22] **Birth Control and the State.** By C. P. Blacker, M.R.C.S., E. P. Dutton & Co., New York, 1926.

was largely due to the overpopulation of Germany and believes it is the duty of the English medical profession to take steps "in the direction of an international control of population and would thereby lay the basis for a genuine and permanent world peace." The author emphasizes that at present we have no really satisfactory contraceptive applicable for all cases. The tone of this little book is sane and objective. Whether or not the political deductions made are justified, the American profession might at least recognize the fact that this propaganda is gaining ground steadily and is here to stay. How long it will take to overcome the obstacles offered by certain governmental and religious groups remains to be seen, but, particularly in countries where women have the vote, an entire change of policy will unquestionably be forced upon the politicians.

Problems of Human Reproduction[23] is a rather small and well-written book meant for the general reader and is supposed to contain whatever is new, not yet widely known, which might prove useful and interesting. The book deals with a very large amount of interesting detail. Unless the reader, however, is unusually well informed, particularly on subjects of biology, I am afraid that some of the contents will be above his head. To the medical man interested in a general survey of this important subject, the book has considerable to offer in spite of numerous inaccuracies.

ENDOCRINOLOGY

A new three volume handbook[24] on internal secretions is appearing under the editorship of Dr. Max Hirsch of Berlin. The bulk of the contributors are from Germany, a few from Austria, and four from New York City. Of the latter, only one can be regarded as being representative of American research or opinion. So far only the first installment of volumes one and two have been submitted to us for review. Volume one contains an introduction by Hirsch, and an article dealing with the pancreas (Herxheimer of Wiesbaden), with a very detailed and satisfactory discussion of the anatomy of the organ as well as the changes in diabetes. The second, by Lahm of Chemnitz, covers the embryology and morphology of the ovaries, uterus, vagina, clitoris, placenta, and mammary glands as organs of internal secretion. This exposition is rather sketchy.

In the first installment of the second volume, there is an article by Asher of Bern on the general physiology of the internal secretions. Next comes the chemistry of the incretions by Guggenheim of Basel, which is a very thorough review in brief extract of this important phase. A large part of this installment is taken up by Asher's physiology of the thyroid which is very thorough and up to date, the final article being by the same author on the physiology of the parathyroid. A very complete bibliography is appended to each article and lends its added value.

Berkeley, in dealing with the *Principles and Practice of Endocrine Medicine*[25] attempts to cover a very difficult field. It takes much courage "to define the actual scientific status of endocrinology today," par-

[23] **Problems of Human Reproduction.** By Paul Popenoe, Baltimore, The Williams and Wilkins Co., 1926.

[24] **Handbuch der Inneren Sekretion.** Edited by Dr. Max Hirsch, Berlin, von Curt Kabitzsch, Leipzig.

[25] **The Principles and Practice of Endocrine Medicine.** By William N. Berkeley, Ph.D., M.D., Lea & Febiger, Philadelphia and New York.

ticularly as his book is primarily meant for doctors in active practice, who, as the reviewer knows to his sorrow, at once desire to apply the very newest hypothesis to their next patient. I think that the author has shown an honest desire to accomplish his difficult task. He has collected the material with diligence and care but the chapters of his book are very unequal in their exposition. The thyroid, for example, is well and convincingly handled, perhaps because this is the one storage gland and the one endocrine preparation which is really satisfactory. In the parathyroid, much too much has been taken for granted even though the author does not show an undue amount of credulity. On the whole, Berkeley shows a healthy amount of scepticism and reserve, quite unusual in books of this character. The weakest chapter is the one on the gonads in which the newest and most striking acquirements of the last years hardly have been touched upon. If the general practitioner insists upon having a book dealing with endocrine therapy before the pharmacologist is able to offer satisfactory products, this book is certainly to be recommended, as it attempts a really impossible task with some degree of conservatism and discretion.

PATHOLOGY; SURGERY

Human Pathology by Karsner[26] is a textbook for the general practitioner and student in which the author desires to emphasize, as all modern pathologists want to do, the functional aspect of disease. The entire field is covered adequately. The text is clear, clean cut, and terse. It is at times a trifle too impersonal to fully carry its message. The illustrations are excellent. This applies equally well to the gross and microscopic specimens. The latter are neither so diagrammatic as to be unusable for comparison with actual slides, nor so overdetailed and "artistic" as to be bewildering. The bibliographies at the end of each chapter, although far from complete, have been selected, in most instances, with considerable judgment, so as to give those interested at least some guidance as to where to look up a subject in greater detail. Why the author classifies melanoma under sarcomata I do not grasp. The classification of kidney diseases is very involved. As happens in every first edition, there are certain omissions which we hope will be taken care of in subsequent revisions of the work. On the whole, this is a very satisfactory book ranking with some of the best known textbooks dealing with this subject in the English language.

"The surgery of today is based on pathology." With this introductory remark of Boyd to his *Surgical Pathology*[27] no one can disagree. That this pathology should be that "of the living" is also true. With this viewpoint in mind, the author has attempted to cover, with only partial success, the pathology of the entire body. He is very good and clear in describing new theories in simple, understandable terms. I will instance Dreyer's work on the selective effect of stains on bacteria, the healing of wounds as described by Carrel, the modern theories dealing with cancer. On the other hand, Boyd shows an undue inclination to base many points of his pathology on the as yet much disputed work of Rosenow, of Rochester, Minnesota, dealing with the selective localiza-

[26] **Human Pathology.** By Howard T. Karsner. Introduction by Simon Flexner, M.D., Philadelphia, J. B. Lippincott Co.

[27] **Surgical Pathology.** By William Boyd, M.D., M.R.C.P.Ed., F.R.S.C., Philadelphia and London, W. B. Saunders Co.

tion of various strains of bacteria. Throughout the influence of the Mayo Clinic as well as of the English School is felt. It is of distinct value to the American physician to have both of these points of view stressed.

In my opinion the author has failed to demonstrate in given cases the applicability of the pathologic findings to the condition with which the physician has to deal. This is a difficult task but would serve to elevate the book from mediocrity to real permanence and usefulness. I cannot agree with the author that the seriousness of "septicemia" depends largely upon whether secondary foci of inflammation are set up in distant parts. In fact, in certain cases of "bacteremia," which I think is a preferable designation, the recovery of the patient dates from the time that localization takes place. Again in the interpretation of chronic metritis and fibrosis uteri where only in the final line attention is drawn to the ovary as the cause for the intractable hemorrhages of puberty, the gonad should have the leading motif in the entire discussion of so-called "chronic metritis" and "fibrosis." The illustrations are not good, and the references for further study are too scant as well as not sufficiently representative to be of much value.

A mellow, short book for the general practitioner has a misleading title. Instead of being called *Abdominal and Pelvic Surgery for Practitioners*[28] it should be the "Diagnosis of Abdominal and Pelvic Conditions for Practitioners." Morison began his activity at the time when the sole choice lay between castor oil and opium. Today, he says "the chief cause of death at the present time is, and always has been —*delay.*" He claims that thousands of lives are annually lost from abdominal injuries and diseases, because operation has not been done in time to stop hemorrhage, to prevent or arrest sepsis, or to remove the focus of the disease. In his introduction, he analyzes the strange anomaly that "though the knowledge and usefulness of the practitioner are enormously greater than those of his predecessors, his prestige has diminished in proportion to the professional advance he has made." He continues, "Patients frequently tell me, when asked who is their doctor, that they have none, but when ill they consult specialists . ." "Operators are like golfers. Many can play at golf after prolonged instruction and practice but *few* can ever play golf. There are *many* operators, but *few* surgeons" and he predicts " . . . that the time is ripe for 'the doctor' to come into his own again, by realizing his responsibilities in the way I have proposed—as the guide and friend of his patient." To make his point, and he makes it very successfully, innumerable short histories of concrete cases are given covering the entire field of abdominal and pelvic surgery. It is a most valuable little book; although elementary it is fundamental and can be read with enjoyment and profit by the most instructed.

To those of us doing surgery in the Zone of the Advance in 1918, Tarnowsky's book[29] would have been an invaluable boon. He has written this "Military Surgery of the World War adapted to Civil Life" and it will prove of extreme value to the industrial surgeon. Any one interested in drawing deductions from the tremendous surgical expe-

[28] **Abdominal and Pelvic Surgery for Practitioners.** By Rutherford Morison. Humphrey Milford Oxford University Press, London.

[29] **Emergency Surgery. The Military Surgery of the World War Adapted to Civil Life.** By George de Tarnowsky, M.D., Lea & Febiger, Philadelphia and New York, 1926.

rience acquired during the World War will do well to look on page 21 where, under twelve short captions, the author sums up the main contributions and improvements. The industrial worker of today is probably unaware of the huge amount of benefit he has derived from the experience gathered at the front, and the yearly army of industrially maimed has an increasing number returning to active work and health through the lessons learned. I hope that the next edition of this valuable treatise will feature anatomy even more than the present edition, because I know from personal experience in France, that many simple poster-like charts of the human anatomy are worth more than pages of text which, when in a hurry, no one consults or reads. In such a book, also, the changes in anatomy due to hematoma or distortion by trauma should be illustrated rather than the normal anatomy of a region.

In commemoration of the seventy-fifth birthday of a beloved and venerated colleague, the members of the Liverpool Medical Institution have published the selected papers on Surgery and Pathology of F. T. Paul.[30] These papers which start in the year 1881 and extend to 1913, give an outline of the varied activities of this well-known surgeon whose chief claim to recognition lies in the simplifications of intestinal surgery connected with his name. The simple clear articles are as modern today as when published, some of them nearly fifty years ago. The intense interest which Paul evinced for pathology is reflected throughout the book which touches on such diverse subjects as the reasons of syphilis, goiter, the histology of dentine, and the degree of malignancy of epithelioma. The technical articles dealing with the intestine are so well known that they are referred to by every surgeon.

Consistent with its policy of isolation, the United States depends upon volunteer participants to report on the Third International Congress of Military Medicine and Pharmacy[31] which was held in Paris, April, 1925. The proceedings were published by Bainbridge, in *The Military Surgeon.*

The subjects dealt with were those of technical specialization; the selection from troops of the tuberculous; the etiology and treatment of traumatic arthritis; and finally an analysis of dressing and suture material. It would be well for all of the medical profession interested in military surgery to look over this concise report.

PEDIATRICS

The second edition of Levinson's *Examination of Children by Clinical and Laboratory Methods*[32] is an exceedingly well compiled small textbook dealing with all the methods in vogue for the examination of children and their interpretation. The student will find it an excellent guide to use in connection with his practical and laboratory work, while the practitioner will rely upon it in making all the examinations necessary in pediatrics.

In the future, books dealing directly with infancy or any pediatric subject will be turned over to the department of pediatrics of our jour-

[30] **Selected Papers, Surgical and Pathological.** By F. T. Paul, Bailliere, Tindall and Cox, London, 1925.

[31] **Report on Third International Congress of Military Medicine and Pharmacy, Paris, 1925.** By Commander Wm. S. Bainbridge. Washington, D. C., 1926.

[32] **Examination of Children by Clinical and Laboratory Methods.** By Abraham Levinson, M.D., Ed. 2, The C. V. Mosby Co., St. Louis, 1927.

nal. However, before taking this radical step, I confess to having read with enjoyment especially the preface of Morse's *Clinical Pediatrics.*[33] The introduction is refreshingly naive, if I may apply this somewhat doubtful term to the utter truthfulness of maturity instead of to the callowness of youth. I shall be proud if ever I have the courage to start a book of my own with the preface "this book was written primarily for my amusement" and adding "I have not attempted to give detailed descriptions of microscopic pathologic changes, which I should have been compelled to copy from some other book and which I would not recognize if I saw them. Moreover," the author continues ". . I have written most about those diseases concerning which I felt I knew most or was most inteersted in . . . ." In spite of this introduction, the reader will find that almost every pediatric subject has been adequately covered without pretense but with thoroughness, and that the five senses are still trusted in helping to make a diagnosis. Even the "sixth sense" which I think Dr. Oliver Wendell Holmes called common sense, is also appealed to. The reproductions of illustrations are surprisingly poor either because the paper is not of good enough quality or because the photographs are underexposed. In spite of the author's disclaimer none of the modern methods of diagnosis have been overlooked in the treatise.

Nervous and Mental Disorders from Birth through Adolescence by Sachs and Hausman[34] is an entirely rewritten volume based on the well-known earlier work of the senior author, called *Nervous Diseases of Children* which appeared more than two decades ago. Part one, by Hausman, is a short but very well-preserved outline of the structure of the nervous system in its relation to function, as well as the current methods of neurologic examination needed to establish a diagnosis. Part two deals with the organic diseases of the nervous system, covering every phase, from those diseases dating from antenatal conditions, birth injuries, through early childhood to adolescence. To attempt even an outline within the space at my disposal, would reduce this review to a mere index of the book. The infectious brain diseases, such as anterior poliomyelitis, epidemic cerebrospinal meningitis, epidemic encephalitis are very well presented. This as well applies to the chapter on epilepsy, speech disorders, and disorders of sleep. Endocrine diseases are dealt with in a very sane, but somewhat sketchy, fashion. I would have liked to have had Sach's experience with herpes zoster and herpes simplex recorded in much more detail, as our knowledge of the significance of these diseases is still in the making.

My greatest interest was concentrated on that portion of the book dealing with mental disturbances in which I was interested to see the viewpoint expressed by Sachs upon the disorders usually handled by the psychoanalyst. Chapter thirty-one on the normal child, the normal youth, development and training is admirable, well balanced, and sane. The author says that training is more important than heredity, that the nervous mother is more often at fault than the child, that in spite of Freudian teachings, the mother should continue to care for the child, that obedience should not be considered an obsolete virtue, that "our

[33] **Clinical Pediatrics.** By J. L. Morse, M.D., W. B. Saunders Co. Philadelphia, 1926.

[34] **Nervous and Mental Disorders from Birth through Adolescence.** By B. Sachs, M.D., and Louis Hausman, M.D., Paul B. Hoeber, Inc. New York, 1926.

entire social organization is based upon respect for authority," that character comes first, taking precedence over knowledge. He insists, and there I believe an increasing number of thoughtful medical men will agree with him, that Freud and his followers have overemphasized sex. "Granted" says he, "that the psychoanalyst has developed a 'technic' which abets his purposes, the psychologist and psychiatrists of former days were also in the habit of analyzing mental processes by seeking the original psychic symptoms and by endeavoring to ascertain the causes that led to the development of nervous or mental phenomena. *The great difference, however, was that we did not insist that some sexual irregularity must be the cause: we were taught by experience that family feuds, business reverses, the death of a dear relative, a serious disappointment in love (not always a purely sexual emotion) were common causes.*" (*The italics are mine.*) He emphasizes that by Freud everything is reduced to sex, that infantile libido, the Oedipus Complex, and similar striking catch words have been worked to death. He justly says that ". . . . the trouble with the Freudians is that they insist that your mind is always filled with nasty thoughts or that you are trying to hide something." While Sachs is somewhat overrabid in his antagonism to the present craze, I believe, after having watched the growth and decline of innumerable medical fads, that his point of view will be fully justified within the next ten years, after a certain section of the laity has exhausted its keenest enjoyment of some phases of Freudian teachings. Then the real enlightenment ascribable to Freud's theories will receive their proper recognition and evaluation.

ELECTRICITY; RADIOTHERAPY; MISCELLANEOUS

Dr. Morgan[35] has written a small descriptive book treating of electrothermic methods which include electrodesiccation and electrocoagulation. Descriptions of electricity, history, and apparatus are extremely nontechnical and too elementary. The actual technical review of the method is satisfactory and on the whole gives a somewhat overenthusiastic account of the value of these methods.

Another book on x-ray is edited by Prof. Hans Meyer of Bremen,[36] a textbook of radiotherapy of which the third volume has been sent for review. This deals exclusively with x-ray therapy in internal medicine. Apparently this form of treatment is being very widely used not only in diseases of blood and hematopoietic organs but especially in all types of tuberculosis, in exophthalmic goiter, the intestinal tract, and even in bronchial asthma. Why hypophysis and mediastinal tumors are described in this connection is not clear to me. Such diverse diseases as hyperacidity, neuralgias, chronic arthritis and erysipelas have been subjected to the effect of rays. The effects of radioactive substances and ultraviolet light, are discussed as well as diathermy. A large chapter is devoted to the treatment of diseases of children.

For our circle of readers the fourth volume when forthcoming, which deals with therapeusis of gynecology, will be of more vital interest.

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[35] **Electrothermic Methods in the Treatment of Neoplastic Diseases.** By J. Douglas Morgan, M.D., Philadelphia, F. A. Davis Co., 1926.

[36] **Lehrbuch der Strahlentherapie. Band III: Die Strahlentherapie in der inneren Medizin.** Edited by Prof. Dr. Hans Meyer, Urban & Schwarzenberg, Berlin, 1926.

The second volume of the *Medizinischen Strahlenforschung*[37] (previously discussed in our review of January, 1926) has now appeared. The promise of the first volume has been fully kept up both as to the excellency of the format as well as to the contents. Of especial interest to the gynecologist and abdominal surgeon are roentgen effects on duodenal ulcer by Berg of Frankfort; the influence of the short wave length upon the acid and base equilibrium of the body and especially that of the blood by Kroetz of Greifswald; the endovesicle electrocoagulation by Scheele; and finally the results of experimental exposure of the ovaries to the rays by Geller of Breslau. This author believes that exposure of the ovaries to the rays may produce at a later date defective children or monsters, although this likelihood is greatly reduced by the fact that such damaged ova usually are aborted early during pregnancy. He has demonstrated that small doses may stimulate the ovary because the partly atretic follicles are destroyed by the rays and therefore allow normal ovulation to take place. As I said when reviewing the previous volume, this handbook will prove of utmost use to all branches of the medical profession.

Of the diversified contents of this volume[38] of *International Clinics*, the following titles should interest our readers—A Summary of the Present Knowledge of Vitamins and Their Therapeutic Importance, by N. P. Norman; Acidosis and Alkalosis in Infancy and Childhood, by J. H. Hess of Chicago; the articles dealing with travel in Italy; and in conclusion, the biography of Sir Clifford Allbutt, written by Rolleston.

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[37] **Ergebnisse der medizinischen Strahlenforschung.** Edited by H. Holfelder, H. Holthusen, O. Jüngling, H. Martius. Vol. 2, Georg Thieme, Leipzig, 1926.

[38] **International Clinics.** Volume III, Thirty-sixth series, 1926. J. B. Lippincott Co., 1926.

Books Received

MOTHER AND UNBORN CHILD, By Samuel Raynor Meaker, associate professor of gynecology, Boston University School of Medicine. With 22 illustrations. The Williams & Wilkins Company, Baltimore, 1927.

KOMPENDIUM DER GEBURTSHILFE. Von Dr. Walther Hannes, Professor an der Universitaet in Breslau. Zweite, neubearbeitete Auflage. Mit 160 teils mehrfarbigen Abbildungen. Urban und Schwarzenberg, Wien, 1927.

L'HYSTERECTOMIE SUBTOTALE OBLIQUE. Par Martin Gomes, professeur, chirurgien de l'hôpital Santa Casa. Barcellos, Bertaso & Cia, Porto Allegre, Bresil. 1927.

BIRTH, STILLBIRTH, AND INFANT MORTALITY, for 1924. Tenth Annual Report, Washington, Government Printing Office, 1926.

DIE UNFRUCHTBARKEIT DER FRAU. Von Dr. Erwin Graff, Professor der Geburtshilfe und Gynaekologie, Universitaet Wien. Verlag von Julius Springer, Wien, 1926.

HANDBUCH DER INNEREN SEKRETION. Heraugegeben von Dr. Max Hirsch, Berlin. III. Band, Lieferung i. Verlag von Kurt Kabitzsch, Leipzig, 1927.

OPERATING ROOM PROCEDURE for nurses and internes. By Henry C. Falk, assistant attending surgeon at the French Hospital, etc., etc. With a foreword by Eugene H. Pool, professor of surgery, Columbia University, etc. With 275 illustrations. G. P. Putnam's Sons, New York, 1925.

THE PHYSIOLOGY OF THE CONTINUITY OF LIFE. By D. Noel Paton, Regius Professor of Physiology, University of Glasgow. McMillan and Co., Lim. London, 1926.

INTERNATIONAL CLINICS. Volume IV. Thirty-sixth Series, 1926, J. B. Lippincott Company, 1926.

TRANSFUSION OF BLOOD. By Henry M. Feinblatt, Assistant Clinical Professor of Medicine, the Long Island College Hospital, Brooklyn, N. Y., etc., etc. Illustrated by 24 engravings. The Macmillan Company, New York, 1926.

DE LA CONTRACTION UTERINE et des dyscinesies correlatives. Par L. A. Demelin, accoucheur honoraire des Hopitaux de Paris, etc. Avec 16 figures dans le texte. Libraire Octave Doin, Paris, 1927.

BIOLOGIE UND PATHOLOGIE DES WEIBES, heraugegeben von Professor Josef Halban, Wien, und Professor Ludwig Seitz, Frankfurt. Lieferung 30. Verlag von Urban und Schwarzenberg, Wien, 1926.